

## *Dracograllus* (Nematoda : Draconematinae) from Papua New Guinea, with descriptions of new species.

Leopold III Biological Station, Laing Island - Contribution no. 158

by W. DECRAEMER

### Summary

Ten species of the nematode genus *Dracograllus* ALLEN & NOFFSINGER, 1977 have been found in marine meiofaunal samples from Madang Province, Papua New Guinea. Seven new species, *Dracograllus cornutus* sp. n., *D. grootaerti* sp. n., *D. laingensis* sp. n., *D. minutus* sp. n., *D. papuensis* sp. n., *D. pusillus* sp. n. and *D. spinosus* sp. n. are described. Additional information is given on *D. demani* ALLEN & NOFFSINGER, 1977 and *D. eira* (INGLIS, 1968), including data on juvenile stages. The genus *Dracotoramonema* ALLEN & NOFFSINGER, 1977 is considered a synonym of the genus *Dracograllus*.

**Keywords:** *Dracograllus*, taxonomy, Papua New Guinea.

### Résumé

Dix espèces de nématodes du genre *Dracograllus* ALLEN & NOFFSINGER, 1977 ont été trouvées dans des échantillons de la meiofaune marine de la Province de Madang, Papouasie Nouvelle-Guinée. Sept nouvelles espèces, *Dracograllus cornutus* sp. n., *D. grootaerti* sp. n., *D. laingensis* sp. n., *D. minutus* sp. n., *D. papuensis* sp. n., *D. pusillus* sp. n. et *D. spinosus* sp. n. sont décrites. Des données complémentaires sont fournies pour *D. demani* ALLEN & NOFFSINGER, 1977 et *D. eira* (INGLIS, 1968) y compris sur les stades juvéniles. Le genre *Dracotoramonema* ALLEN & NOFFSINGER, 1977 est considéré comme synonyme du genre *Dracograllus*.

**Mots-clefs:** *Dracograllus*, taxonomie, Papouasie Nouvelle-Guinée.

### Introduction

As part of a series of papers on the marine nematode fauna of Papua New Guinea, this paper deals with a study of the genus *Dracograllus* (Draconematinae). From 1977 on, large number of meiobenthos samples mainly from littoral and also from sublittoral localities have been taken by several colleagues during their stay at the biological Station on Laing Island.

Among the nematodes of the samples examined are ten species of the genus *Dracograllus*, seven of which are new to science: *D. cornutus*, *D. grootaerti*, *D. laingensis*, *D. minutus*, *D. papuensis*, *D. pusillus* and *D. spinosus*.

### Material and Methods

*Dracograllus* species studied were collected at:

- Laing Island, eastern reef flat, 200 m N. of Biological Station, on 10.VI.1982, by P. GROOTAERT; I.G. 26480: Sample 1255 of overgrown dead coral debris: *D. papuensis*, 6 ♀, 3 juv.; *D. pusillus*, 1 ♂; Sample 1256 of polychaete tubes of sand and mucus: *D. laingensis*, 1 ♂, 2 juv.; *D. minutus*, 1 ♂; *D. papuensis*, 2 ♀; *D. spinosus*, 1 ♂; *D. demani*, 1 ♀.
- Laing Island, eastern reef flat, 100 m N. of Biological Station, on 11.VI.1982, by P. GROOTAERT; I.G. 26480: Sample 1266 of calcareous algae, sand and silt, taken at low tide, 20 m from high water level: *D. demani*, 1 ♂, 1 ♀; Sample 1267 of green algae *Chlorodermis fastigata*: *D. papuensis*, 1 ♂, 1 ♀; *D. demani*, 1 ♀; Sample 1268 of polychaete tubes, 10 m from high-water level: *D. eira*, 2 juv.; *D. grootaerti*, 1 juv.
- Laing Island, lagoon, sample 94 from between *Hali-medea* at 3/4 m depth, on 12.V.1977, by J. VAN GOETHEM; I.G. 25681: *Dracograllus* sp. 1, 1 ♀ (see DECRAEMER, 1982).
- Laing Island, sample 115, sublittoral sand sample taken at the northern end of the island, on 15.V.1977, by J. VAN GOETHEM; I.G. 25681: *D. cornutus*, 2 ♂, 1 ♀, 2 juv.; *D. eira*, 1 juv.
- Laing Island, sample 23 from north-western reef flat, coarse coral sand under large pieces of dead coral in the tidal zone, on 8.V.1978, by J. VAN GOETHEM; I.G. 25848: *D. laingensis*, 1 ♀; *D. demani*, 1 juv., *D. eira*, 114 ♂, 71 ♀, 38 juv.
- Duangit Reef, east side, sample 127 of coral sand at -42 m depth, on 22.V.1979, by J. PIERRET & J. VAN GOETHEM; I.G. 26080: *D. grootaerti*, 1 ♂, 4 ♀, 1 juv.; *D. demani*, 2 ♂, 2 ♀, 1 juv.

The samples collected by P. GROOTAERT were fixed in hot 10 % neutralised formalin in sea water, those collected by J. VAN GOETHEM were fixed in 5 % buffered formalin. Nematodes were transferred to pure glycerin by the method of DE GRISSE (1965) and mounted on COBB-slides. The drawings were made with the aid of a camera lucida of Reichert Polyvar.

Type specimens of the new species are deposited in the nematode collection of the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel (KBIN), slides RIT

nrs 170-189 and the nematode collection in the University of California, Davis (UCNC).

The following specimens of nominal species from other collections were examined :

*D. demani* : paratypes, 1 ♀, 1 ♂, 1 juv., slides 383-385 from the nematode collection of the Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium (RUG); and 1 ♂, 1 ♀ paratype of *D. stekhoveni*, RUG slides 381-382; *D. filipjevi*, RUG slides 386-387; *D. timmi*, RUG slides 418-419.

#### Abbreviations used in the text

ABD, body diameter at level of anus  
 CAT, length of cephalic adhesion tubes  
 Ceph Acan-set, length of largest sublateral acanthiform setae on rostrum  
 Corn-set, corniform setae  
 cs, length of cephalic setae  
 gub, length of gubernaculum  
 hw, maximum head diameter  
 hl, head length  
 L, body length  
 L', distance from anterior end to anus  
 mbd Ph, maximum body diameter in pharyngeal region (mbd), minimum body diameter  
 mbd, maximum body diameter at midbody level  
 mbd V, body diameter at level vulva  
 PAT, length of posterior adhesion tubes  
 Ph, length of pharynx  
 spic, length of spicules, measured along the median line  
 SIAT1, SIAT2...SIAT1, length of first, second...last pair of sublateral adhesion tubes  
 SS Ph, length of long subdorsal somatic setae in pharyngeal region  
 SvAT1, SvAT2...SvAT1, length of first, second...last pair of subventral adhesion tubes  
 SER (L/W), length of swollen body area in pharyngeal region divided by greatest body width in this area  
 t, tail length  
 tnr, length of non-annulated tail region  
 VAT, length of medioventral posterior adhesion tubes  
 V, position of the vulva as a percentage of the total body length from anterior  
 a, b, c, c', proportions of DE MAN (1880).  
 All measurements are in  $\mu\text{m}$ . Mean value between brackets.

#### Descriptions

Family Draconematidae FILIPJEV, 1918  
 Subfamily Draconematinae FILIPJEV, 1918  
 Genus *Dracograllus* ALLEN & NOFFSINGER, 1977

*Dracograllus cornutus* sp. n. (Fig. 1 A-I)

#### Type specimens :

Holotype male, slide RIT 184. Paratypes : 1 ♂, slide RIT 184; 1 ♀, slide RIT 184; 3 juv., slides RIT 185-186.

#### Type locality :

Laing Island, sample 115 (see Material and Methods).

#### Etymology :

The specific name *cornutus* (Latin, meaning who has horns) alludes to the presence of large copulatory thorns in male.

#### MEASUREMENTS

##### Holotype male.

L = 610, CAT = 18, cs = 14, hw = 29, Ph = 115, mbd Ph = 47, (mbd) = 17, mbd = 65, t = 77, tnr = 20, ABD = 19, SIAT1 = 20, SIAT2 = 18, SIAT3 = 17, SIAT4 = 18, SIAT5 = 16, SIAT6 = 16, SIAT7 = 22, SIAT8 = 15, SIAT9 = 17, SIAT10 = 23, SIAT13 = 17, SIAT14 = 23, SIAT15 = 24, SIAT16 = 16, SvAT1 = 15, SvAT2 = 15, SvAT3 = 14, SvAT4 = 14, SvAT5 = 12, SvAT6 = 13, SvAT7 = 12, SvAT8 = 12, SvAT9 = 10, SvAT10 = 10, SvAT11 = 11, SvAT12 = 11, SvAT13 = 12, spic = 55, gub = 15; a = 9.4, b = 5.3, c = 7.9, c' = 3.8. No SIAT = 16, No SvAT = 13, No CAT = 11.

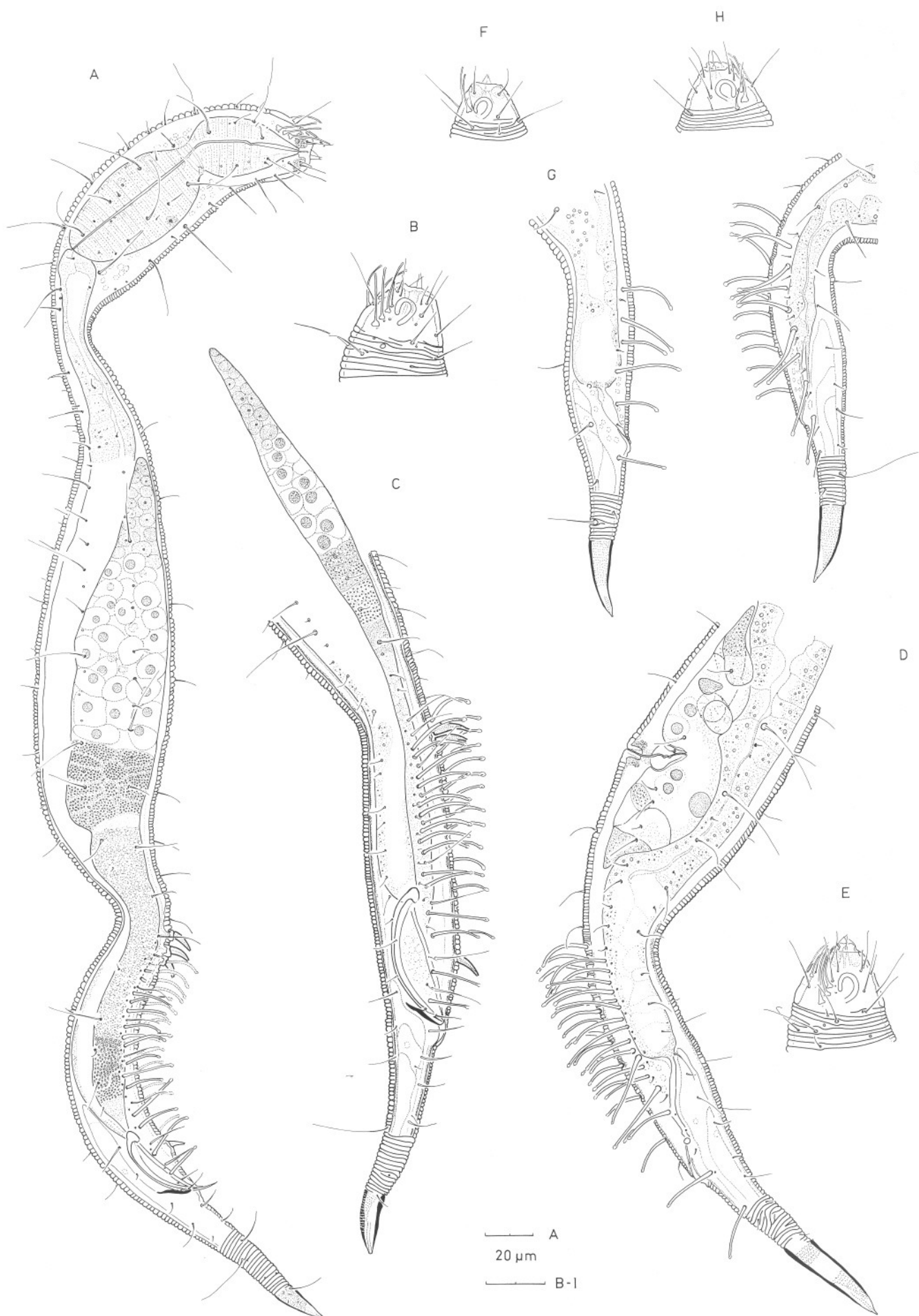
##### Paratype male (n = 1).

L = 495, CAT = 17, cs = 14, Ph = 104, mbd Ph = 41, (mbd) = 15, mbd = 47, t = 76, tnr = 21, ABD = 20, SIAT1 = 22, SIAT2 = 21, SIAT3 = 22, SIAT4 = 18, SIAT5 = 21, SIAT6 = 19, SIAT7 = 19, SIAT8 = 22, SIAT9 = 18, SIAT10 = 22, SIAT11 = 21, SIAT12 = 21, SIAT13 = 18, SIAT14 = 22, SIAT15 = 16, SvAT1 = 20, SvATt = 14, spic = 56, gub = 13; a = 10.5, b = 4.8, c = 6.5, c' = 3.8. No SIAT = 15-18, No SvAT = 13, No CAT = 10.

##### Paratype female (n = 1).

L = 480, CAT = 18, cs = 10, hw = 29, Ph = 103, mbd Ph = 46, (mbd) = 16, mbd V = 54, t = 79, tnr = 39, ABD = 19, SIAT1 = 25, SIAT2 = 24, SIAT3 = 25, SIAT4 = 24, SIAT5 = 21, SIAT6 = 24, SIAT7 = 18, SIAT8 = 26, SIAT9 = 18, SIAT10 = 19, SIAT11 = 26, SIAT12 = 19, SIAT13 = 18, SIAT14 = 25, SIAT15 = 27, SIAT16 = 17, SIAT17

Fig. 1. - *Dracograllus cornutus* sp. n. - A. Habitus of holotype ♂. - B. Surface view of head (holotype ♂). - C. Male reproductive system and tail end in surface view (paratype). - D. Female reproductive system and posterior body region (paratype). - E. Surface view of head (paratype ♀). Third stage juvenile (paratype) : - F. Surface view of head. - G. Posterior body region. Fourth stage juvenile (paratype) : - H. Surface view of head. - I. Posterior body region.



= 19, SIAT18 = 20, SvAT1 = 18, SvAT2 = 19, SvAT3 = 19, SvAT4 = 18, SvAT5 = 19, SvAT6 = 15, SvAT7 = 15, SvAT8 = 16, SvAT9 = 15, SvAT10 = 15, SvAT11 = 15, SvAT12 = 14, SvAT13 = 15, SvAT14 = 14, SvAT15 = 13, SvAT16 = 15, V = 55 %; a = 8.9, b = 4.7, c = 6.1, c' = 4.1. No SIAT = 18, No SvAT = 13-16, No CAT = 10.

#### *Paratype juveniles.*

##### *Fourth stage juveniles* (n = 2).

L = 330-360, CAT = 17-18, cs = 10-12, hw = 26-29, hl (n = 1) = 18, Ph = 78-83, mbd Ph = 44, (mbd) = 12-14, mbd = 40-43, t = 55-58, tmr = 27-28, ABD = 16-17, SIAT1 = 19-22, SIAT2 = 24, SIAT3 = 16-18, SIAT4 = 17-18, SIAT5 = 23-25, SIAT6 = 13-16, SIAT7 = 18-20, SIAT8 = 16-17, VAT1 = 18-20, VAT2 = 16-18, VAT3 = 12-17, VAT4 = 13-16, VAT5 = 13-17, VAT6 = 12-14, VAT7 = 12-14, VAT8 = 12-14, VAT9 = 12-13, VAT10 = 12; a = 7.5-8.4, b = 4.0-4.6, c = 6.0-6.2, c' = 3.4. No SIAT = 8, No SvAT = 9-10, No CAT = 5.

##### *Third stage juvenile* (n = 1).

L = 355, CAT = 15, cs = 10, hw = 23, Ph = 72, mbd Ph = 42, (mbd) = 13, mbd = 41, t = 59, tmr = 27, ABD = 18, PAT1 = 22, PAT2 = 22, PAT3 = 17, PAT4 = 23, PAT5 = 15, PAT6 = 17; a = 8.5, b = 4.9, c = 6.0, c' = 3.3. No PAT = 6, No CAT = 3.

## DESCRIPTION

### *Males.*

Habitus typical of Draconematidae; body arched dorsally and ventrally. Swollen pharyngeal region offset from wider mid-body by narrow neck part. Mid-body posteriorly demarcated by a more or less pronounced ventral knick, followed by a strongly, dorsally arched (Fig. 1 A) or a nearly straight zone (Fig. 1 C) of posterior adhesion tubes. Swollen pharyngeal region 23 % of total body length. Annulation body cuticle without ornamentation. Somatic setae arranged in eight longitudinal rows with minute (2  $\mu$ m), short (11  $\mu$ m) and long (26  $\mu$ m) setae, more or less alternating and provided with a cuticular collar at their insertion.

Rostrum wider than long; lip region withdrawn. Six labial sensory setae, 4.5  $\mu$ m long; granular associated gland cells visible. Four fine cephalic setae, 10-14  $\mu$ m long. Ten to eleven CAT: two pairs of subdorsal tubes in two transverse rows and three pairs of laterodorsal tubes (four tubes on left side in holotype, see 11 CAT) near or just posterior to the amphidial fovea. All CAT with enlarged tip (Fig. 1 B). Several subcephalic setae present. Amphidial fovea short loop-shaped, ventrally whirled and lying about half-way the head length.

Pharynx dumb-bell shaped with large endbulb. Cardia short. Intestine running dorsally from reproductive system. Reproductive system typical of the Draconematidae; extending to beginning of widened mid-body region. Generative and growth zones short, followed by a large vesicula seminalis with numerous pale sperm cells (9-12 by 12-15  $\mu$ m), with granular nucleus (4-4.5  $\mu$ m) in diameter.

Spicules, 55-56  $\mu$ m long, slender, arched; large offset capitulum. Gubernaculum 13-14  $\mu$ m long, with a single trough-shaped distal part and a short double proximal part (4.5  $\mu$ m long) (Fig. 1 C). Two or three (respectively in paratype and holotype) large ventral corniform setae (9-12  $\mu$ m long) just posterior to ventral knick and posterior end mid-body region, and a smaller corniform seta (6.5-8  $\mu$ m long) half-way along the spicule region, when spicules retracted. Corniform setae with open tip and a distinct cuticular collar at their base (Fig. 1 A). Three pairs of anal setae in holotype (Fig. 1 A): two preanal (10-11  $\mu$ m long), one postanal (8  $\mu$ m long).

Posterior adhesion tubes with developed bell-shaped end; all anterior to the cloacal aperture. SIAT with 16 pairs of SIAT in holotype, 15-18 SIAT in paratype; intermingled with fine somatic setae. SvAT with 13 pairs, becoming shorter posteriorly. SIAT with short and longer tubes; the latter are slightly more laterally inserted; near base SIAT insert minute setae (Fig. 1 A, B).

Non-annulated tail end short (26-28 % of total tail); its cuticle perforated (cf punctated appearance); one pair of subventral setae (11  $\mu$ m long). Caudal glands extending anteriorly beyond the cloaca.

### *Female.*

Similar to male in most respects. Reproductive system didelphic-amphidelphic, with both ovaries reflexed to the left side.

Spermathecae not observed. Vagina consisting of a thick-walled proximal part (9  $\mu$ m long) separated by a thin mid-zone from a well cuticularized annular distal part (3.5  $\mu$ m); the latter surrounded by a band of yellowish to brownish granules. No paravulvar setae present.

Posterior adhesion tubes with 18 pairs of SIAT (two pairs on tail) and 13 (right) to 16 SvAT (left). SvAT becoming shorter posteriorly. SIAT with more or less alternating long and shorter tubes, the long tubes slightly more laterally inserted; no intermingling with long somatic setae. Minute setae besides insertion SIAT.

Non-annulated tail end longer than in male, 49 % of total tail; its cuticle perforated (punctated), and provided with 1-2 short subdorsal setae.

### *Juveniles.*

First and second stages not found.

##### *Fourth stage juveniles.*

In most respects similar to adults. Swollen pharyngeal region 29 % of total body length. Cuticular annulation in pharyngeal region with minute spines; scattered. Head with five CAT, two dorsolateral pairs and one dorsal pair. Amphidial fovea short loop-shaped, arms converging together by groove of ventral arm, forming an almost circular outline (Fig. 1 H). Posterior adhesion tubes in three longitudinal rows (two sublateral, one ventral) with eight pairs of SIAT (one pair on tail near anus or just behind it) and nine to ten VAT. SIAT with alternating short and long tubes; VAT becoming shorter posteriorly. Non-annulated punctated tail end 46.5-51 % of total tail; one subventral and one subdorsal seta may be present.



*Third stage juvenile.*

In most respects similar to adults and forth stage juveniles. Swollen pharyngeal region 28 % of total body length. Cuticle with faint scattered spines in pharyngeal region. Head with three CAT, one dorsal and two dorsolateral tubes at level of amphidial fovea. Amphidial fovea, an almost closed loop with circular outline.

Posterior adhesion tubes in two longitudinal subventral rows of six tubes; alternating long and shorter ones; one pair of tubes on tail near anal region. Non-annulated, punctated tail end 46 % of total tail; no somatic setae observed.

*Diagnosis.*

*Dracograllus cornutus* sp. n. can be distinguished in adults by the short loop-shaped amphidial fovea; by the number of CAT (10-11), by the number, length and distribution of the PAT and by the length of the non-annulated tail end in relation to total tail length. In male the new species is characterized by the presence of three to four large ventral corniform setae arranged in two groups, by the length and shape of the slender, arcuated and headed spicules and by the shape of the gubernaculum.

*Differential diagnosis.*

In males *Dracograllus cornutus* sp. n. resembles *Dracotoramonema trispinosum* ALLEN & NOFFSINGER, 1977 by the presence of large ventral corniform setae anterior to the SvAT, and by the differences in length among the SIAT, however, less conspicuous than in *D. trispinosum*.

*Discussion.*

The monotypic genus *Dracotoramonema* ALLEN & NOFFSINGER, 1977 was differentiated from the other known genera in the Draconematinae by the large single ventral corniform seta just before the SvAT in males, by conspicu-

ously long and short slender SIAT and by very large amphids (ALLEN & NOFFSINGER, 1977, p. 89).

In Table 1, a comparison is given between *D. cornutus* sp. n. and the genera *Dracograllus*-*Dracotoramonema* for several differentiating characters. From this table appears that *Dracotoramonema* largely agrees with the genus *Dracograllus* : - 1) very large amphidial fovea are also present among species of *Dracograllus* e.g. in *D. laingensis* and in *D. papuensis*, - 2) SIAT with various degrees in differences in length among them (from conspicuous to inconspicuous) can be found in *Dracograllus* species, but large and short tubes are usually not alternating as in *Dracotoramonema*, - 3) large ventral corniform setae just before the SvAT in males are also present in *D. cornutus*, as far as known not in other species of *Dracograllus*, - 4) a pair of preanal corniform setae is present in *D. cornutus*, not in other species of *Dracograllus*; a pair of preanal corniform setae also occurs in other genera of the Draconematidae e.g. in *Paradraconema newelli* ALLEN & NOFFSINGER, 1977 and a single ventral preanal corniform seta is present in *P. meridionale* (KREIS, 1938).

Taking these considerations into account, I assume *Dracotoramonema trispinosum* to belong to the genus *Dracograllus* and I hereby synonymize the monotypic genus *Dracotoramonema* with the genus *Dracograllus*.

*Dracograllus grootaerti* sp. n. (Fig. 2 A-G)

*Type specimens :*

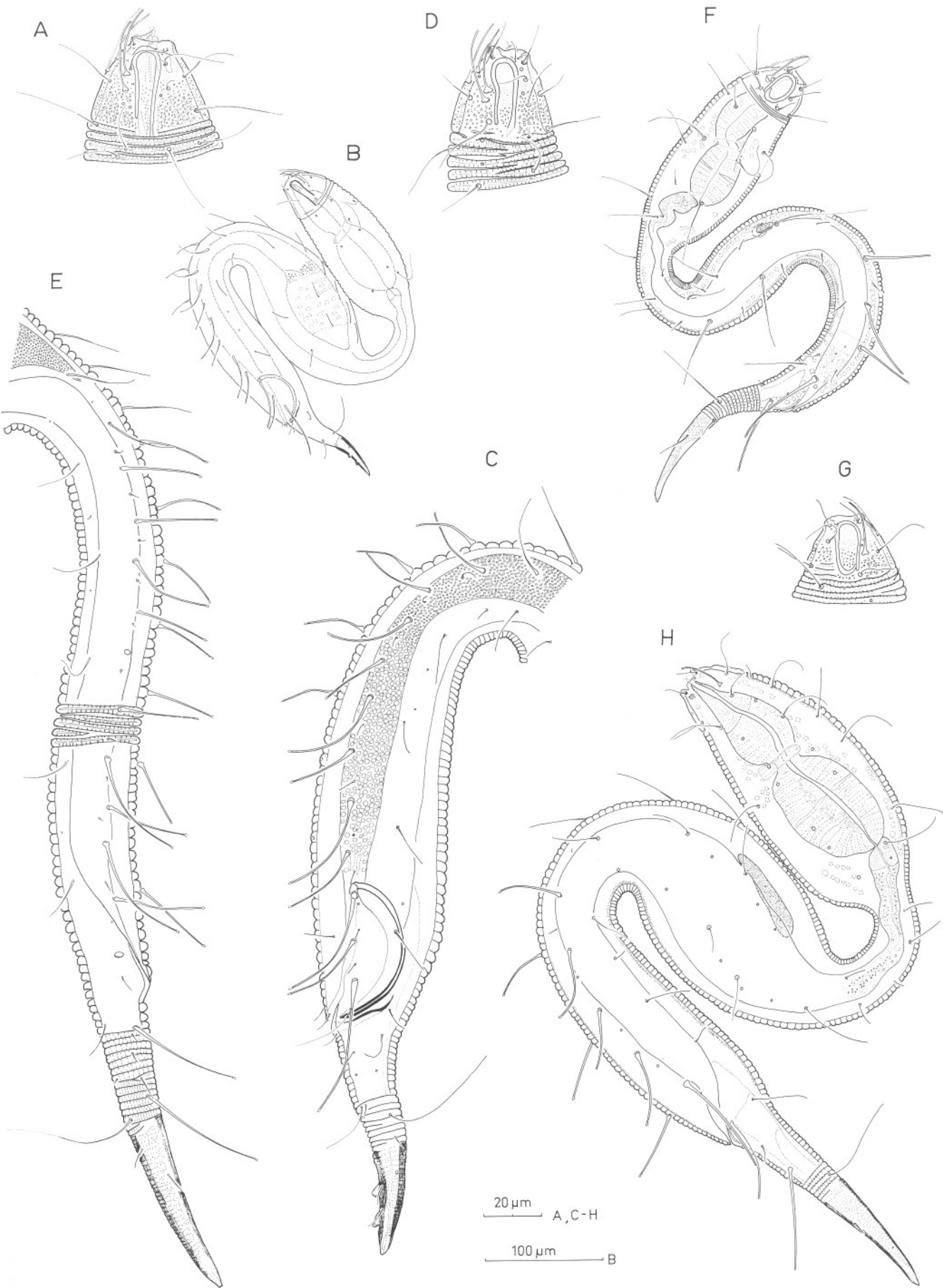
Holotype male, slide RIT 189. Paratype : 4 ♀, slide RIT 172; 2 juv., slides RIT 189, RIT 190.

*Type locality :*

Madang Province, Hansa Bay, Duangit Reef, sample 127 (see Material and Methods).

Table 1. - Comparison between *D. cornutus* sp. n. and the genera *Dracograllus* - *Dracotoramonema*.

Characters	<i>Dracotoramonema</i>	<i>Dracograllus</i>	<i>Dracograllus cornutus</i>
- SIAT : differences in length conspicuous or inconspicuous	conspicuous	conspicuous, inconspicuous	inconspicuous
- SIAT : alternating or not	alternating	usually not alternating	more or less alternating
- amphidial fovea	very large (♂ loop-shape; ♀ unispiral)	large to very large exc. <i>D. eira</i>	moderate
- subventral preanal corniform setae	1 pair	absent	1 pair
- subventral corniform setae just before SvAT	1 single	absent	2-3 single
- number CAT			
adults	8	8, 12-15 or 6	10 (exc. 11)
juv. IV	3	3	3
juv. III	4	4, 6	5
- anal region	swollen, especially in ♂	not swollen, exc. slightly in <i>D. laingensis</i>	not swollen



*Other locality :*

Laing Island, sample 1268.

*Etymology :*

The specific name is chosen in honour of Dr. P. GROO-TAERT, who has kindly put this interesting material at my disposal.

## MEASUREMENTS

*Holotype male.*

L = 650, CAT = 24, cs = 10, hw = 40, Ph = 127, mbd Ph = 60, (mbd) = 20, mbd = 74, SER (L/W) = 2.5, t = 84, ABD = 26, tmr = 39, SIAT1 = 29, SIAT2 = 23, SIAT3 = 24, SIAT4 = 39, SIAT5 = 26, SIAT6 = 39, SIAT7 = 28, SIAT8 = 41, SIAT9 = 30, SIAT10 = 50, SvAT1 = 24, spic = 68, gub = 23; a = 8.8, b = 5.1, c = 7.7, c' = 3.2. No SIAT = 10, No SvAT = 7, No CAT = 8.

*Paratype females (n = 4).*

L = 675-755 (705), CAT = 20-22, cs = 11-14, Ph = 126-136, mbd Ph = 56-57, (mbd) = 19-22, mbd = 84-93, t = 105-113, ABD = 23-24, tmr = 46-67, SIAT1 = 27-31, SIAT2 = 27-31, SIAT3 = 36-37, SIAT4 = 27-28, SIAT5 = 40-41, SIAT6 = 25-28, SIAT7 = 39-45, SIAT8 = 30-32, SIAT9 = 45, SIAT10 = 32-37, SIAT11 = 36-50, SIAT12 = 38-41, SIAT13 = 43 (n = 1), SvAT1 = 25-28, SvAT1 = 30-32, V = 44-47 %; a = 7.5-8.8, b = 5.3-5.6, c = 6.3-6.7, c' = 4.4-4.9, No SIAT = 12-13, No SvAT = 7-9, No CAT = 8.

*Paratype juveniles.**Fourth stage juveniles (n = 1).*

L = 560, CAT = 22, cs = 11, hw = 31, Ph = 108, mbd Ph = 56, (mbd) = 19, mbd = 67, t = 104, ABD = 28, tmr = 57, SIAT1 = 28, SIAT2 = 33, SIAT3 = 27, SIAT4 = 32, SIAT5 = 47, SIAT6 = 36, SIAT7 = 45, SvAT1 = 24, SvAT1 = 27; a = 8.4, b = 5.2, c = 5.4, c' = 3.7. No SIAT = 7, No SvAT = 3, No CAT = 4.

*Third stage juvenile (n = 1).*

L = 305, CAT = 16, cs = 9, hw = 21, Ph = 61, mbd Ph = 30, (mbd) = 12, mbd = 26, t = 62, ABD = 13, tmr = 34, PAT1 = 23, PAT2 = 28, PAT3 = 21, PAT4 = 38, PAT5 = 27; a = 10.2, b = 5.0, c = 4.9, c' = 4.7. No PAT = 5, No CAT = 3.

## DESCRIPTION

*Male.*

Body relatively large and corpulent; more swollen at mid-body than in pharyngeal region. Pharyngeal region 23 % of total body length. Body annules lined with a spiny ornamentation (Fig. 2 A). Somatic setae typical of the Draconematinae.

Head with four cephalic setae. Lip region retracted; six short labial setae and six associated granular glands. Rostrum 1.25 times as wide as long, provided with irregular subcuticular markings; subcephalic setae present. Eight CAT along anterior half of amphidial fovea.

Amphidial fovea long (32  $\mu$ m), inverted U-shaped, with longer ventral arm extending to the first annule.

Pharynx dumb-bell shaped. Cardia small. Intestine a narrow cylinder running dorsally of the genital system.

Reproductive system typical of the Draconematidae. Testis extending to beginning swollen mid-body. Germinative and growth zones short. Vesicula seminalis with numerous rounded sperm cells (Fig. 2 B).

Spicules 68  $\mu$ m long, strongly curved; proximally with knob-like capitulum. Gubernaculum 23  $\mu$ m long, distal part parallel with the spicules, proximal part (10  $\mu$ m long) double and slightly bent. Three pairs of short (7.5  $\mu$ m) anal setae, two anterior to the anal opening (Fig. 2 C).

Posterior adhesion tubes all anterior to the cloacal opening; ten pairs of SIAT and seven pairs of SvAT. SIAT very slender, broadened at basis; alternating long and shorter tubes intermingled with minute somatic setae, except for a longer seta between SIAT1 and SIAT2. Anterior to PAT two subventral rows of long, stiff, posteriorly directed somatic setae, 26-31  $\mu$ m long.

Non-annulated tail end 46 % of total tail; its cuticle punctated, ventrally with two cuticular outgrowths, slightly sclerotized; two pairs of subventral setae and a single sublateral seta on the left side (Fig. 2 C).

*Females.*

Similar to male in most respects; mid-body region conspicuously swollen. Amphidial fovea, inverted U-shaped as in male, both arms about equally long, but shorter than in male (25-28  $\mu$ m) (Fig. 2 D).

Reproductive system didelphic-amphidelphic with both branches reflexed to opposite sides (anterior left, posterior right). No spermathecae observed; sperm cells in uterus. Vagina, 16-19  $\mu$ m long, with short (4  $\mu$ m) well cuticularized distal part and long, wide and weaker cuticularized proximal part. Vulva in anterior body half.

Posterior adhesion tubes with 12-13 SIAT (two of them on tail region) and 7-9 SvAT (Fig. 2 E). SIAT slender, lengthening posteriorly; alternating long and shorter tubes intermingled with minute somatic setae. Anterior to PAT two subventral rows of stiff somatic setae (24-29  $\mu$ m).

Non-annulated tail end 43-61 % of total tail; with perforated cuticle; one pair of short subventral and one pair of short subdorsal somatic setae.

*Juveniles.*

First and second stages not found.

*Fourth stage juvenile.*

Similar to adult for most characters. Swollen pharyngeal

◁ Fig. 2. - *Dracograllus grootaerti* sp. n. - *Holotype male* : A. Surface view of head. - B. Habitus. - C. Posterior body region with tail end in surface view. *Paratype female* : - D. Surface view of head. - E. Posterior body region with parts of body cuticle in surface view. - F. Habitus third stage juvenile (*paratype*). *Fourth stage juvenile (paratype)* : - G. Surface view of head. - H. Habitus.

region 22 % of total body length; mid-body, widest body region. Rostrum with four CAT, one sublateral pair and one subdorsal pair. Amphidial fovea, 20  $\mu$ m long, elongated unispiral, ventrally whirled (Fig. 2 G). Posterior adhesion tubes slender, broad at base, and arranged in four longitudinal rows: two sublateral with seven SIAT (one on tail) and two subventral rows with three SvAT. SIAT with alternating short and longer tubes, intermingled with minute somatic setae. Just anterior to PAT, a single ventral row with three stiff setae (26  $\mu$ m), posteriorly orientated. Non-annulated, punctated tail end, 55 % of total tail length; provided with a pair of subventral somatic setae.

#### *Third stage juvenile.*

In most respects similar to adult and fourth stage juveniles. Swollen pharyngeal region 26 % of total body region. Head with three CAT, one dorsal and two dorsolateral tubes. Amphidial fovea, 13  $\mu$ m long, elongated unispiral, and ventrally coiled (Fig. 2 F).

Genital system consisting of two short branches, 7-8  $\mu$ m long.

Posterior adhesion tubes slender, arranged in two longitudinal subventral rows of five tubes (one on tail); alternating long and shorter tubes.

Non-annulated and punctated tail end 55 % of total tail length, provided on the right side with a sublateral seta.

#### *Diagnosis.*

*Dracograllus grootaerti* sp. n. is characterized by its habitus: a long corpulent body with a spiny ornamentated annulated cuticle; by the large inverted U-shape amphidial fovea in both sexes, unispiral in juveniles; by the length of the non-annulated tail end and in male by length and shape of the copulatory apparatus with slender, strongly arcuated spicules, 68  $\mu$ m long.

#### *Differential diagnosis.*

*D. grootaerti* sp. n. resembles *D. laingensis* and *D. pusillus* by the spiny ornamentation of the annulated body cuticle (less pronounced in *D. pusillus*), and by the large inverted U-shape amphidial fovea in male, different from all other known species of the genus. All three species also possess very slender SIAT, with broadened basis and with alternating shorter and longer tubes as is also the case in *D. spinosus*.

*Dracograllus laingensis* sp. n. (Fig. 3 A-F)

#### *Type specimens:*

Holotype male, slide RIT 181. Paratypes: 1 ♀, 2 juv. slides RIT 181, RIT 170, RIT 188.

#### *Type locality:*

Laing Island, sample 1256 (see material and methods).

#### *Other locality:*

Laing Island, sample 23.

#### *Etymology:*

The specific name refers to Laing Island.

#### MEASUREMENTS

##### *Holotype male.*

L = 460, CAT = 18, cs = 11, hw = 27, Ph = 93, mbd Ph = 32, (mbd) = 16, mbd = 42, SER (L/W) = 3.6, t = 58, ABD = 18, tmr = 24, SIAT1 = 18, SIAT2 = 28, SIAT3 = 17, SIAT4 = 32, SIAT5 = 18, SIAT6 = 35, SIAT7 = 25, SIAT8 = 38, SvAT1 = 11, SvAT2 = 13, SvAT3 = 13, SvAT4 = 16, SvAT5 = 17, SvAT6 = 18, SvAT7 = 17, SvAT8 = 18, SvAT9 = 19, spic = 39, gub = 12; a = 10.9, b = 4.9, c = 7.9, c' = 3.2. No SIAT = 8-9, No SvAT = 8, No CAT = 8.

##### *Paratype female (n = 1).*

L = 440, CAT = 18, cs = 9, hw = 26, Ph = 86, mbd Ph = 32, (mbd) = 16, mbd = 40, t = 78, ABD = 17, tmr = 43, SIAT1 = 21, SIAT2 = 21, SIAT3 = 28, SIAT4 = 21, SIAT5 = 33, SIAT6 = 22, SIAT7 = 39, SIAT8 = 28, SIAT9 = 28, SIAT10 = 43, SIAT11 = 30, SIAT12 = 35, SvAT1 = 17, SvAT1 = 22, V = 44 %; a = 11.0, b = 5.1, c = 5.6, c' = 4.6. No SIAT = 12, No SvAT = 5, No CAT = 8.

##### *Paratype juveniles.*

##### *Fourth stage juvenile moulting into adult male (n = 1).*

L = 405, CAT = 18, cs = 10, mbd Ph = 35, mbd = 40, t = 67, ABD = 19, tmr = 38, SIAT1 = 21, SIAT2 = 29, SIAT3 = 20, SIAT4 = 28, SIAT5 = 45, SIAT6 = 31, SIAT7 = 34, SvAT1 = 17, SvAT2 = 16, SvAT3 = 19; c' = 2.6. No SIAT = 7, No SvAT = 3, No CAT = 4.

##### *Third stage juvenile (n = 1).*

L = 240, CAT = 12, cs = 8, Ph = 49, mbd Ph = 24, mbd = 17, t = 46, ABD = 11, tmr = 29, PAT1 = 18, PAT2 = 21, PAT3 = 17, PAT4 = 24, PAT5 = 19; a = 10.0, b = 4.9, c = 5.2, c' = 4.2. No PAT = 5, No CAT = 3.

#### DESCRIPTION

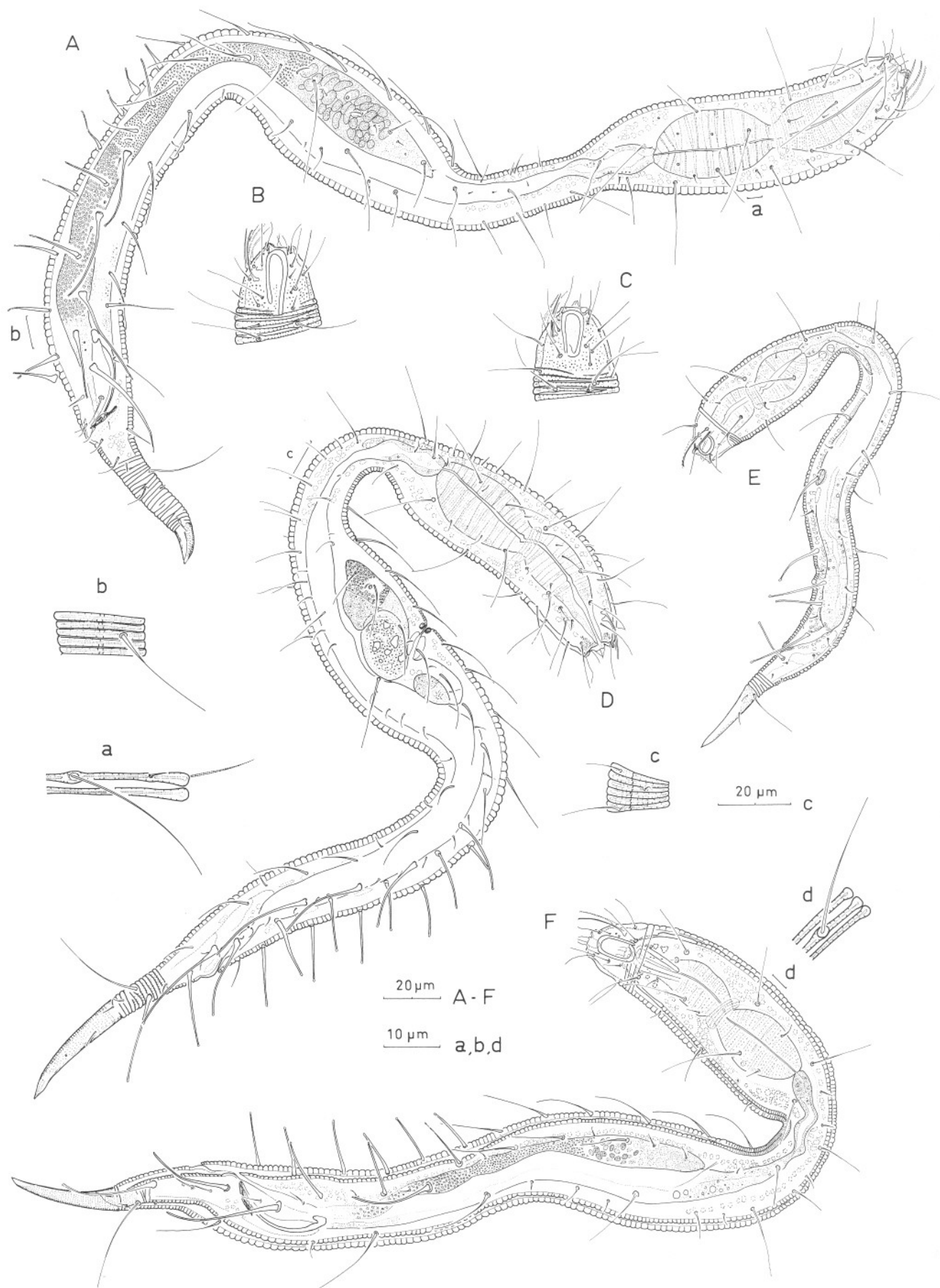
##### *Male.*

Body shape typical of the genus with mid-body more swollen than pharyngeal region. Swollen pharyngeal region rather long and slender, 25 % of total body length. Body annules, except in tail, lined with minute spiny ornamentation; spines more conspicuous in lateral field of narrow neck region. Somatic setae typical of Draconematidae, insertion with marked cuticular collar.

Head with retracted lip region; six labial setae, 4.5  $\mu$ m long; associated granular glands present. Four cephalic

Fig. 3. – *Dracograllus laingensis* sp. n. - Holotype male: A. Habitus with indications a-b of the levels at which the body cuticle is shown in surface view. - B. Surface view of head. Paratype female: - C. Surface view of head. - D. Habitus with indication c of the level at which the body cuticle is shown in surface view - E. Habitus third stage juvenile (paratype). - F. Habitus fourth stage juvenile (paratype).





setae inserted near anterior end rostrum. Rostrum 1.2 times as wide as long, with small vacuolar subcuticular markings; subcephalic setae present (Fig. 3 B). Eight CAT: two sublateral and two subdorsal pairs arranged in two transverse rows near anterior half amphidial fovea. Amphidial fovea long (23  $\mu\text{m}$ ) inverted U-shaped structures, with longer ventral arm.

Pharynx dumb-bell shaped. Cardia small. Intestine narrow cylindrical, dorsally of the reproductive system.

Reproductive system typical of the Draconematidae. Testis extending to the beginning of the mid-body swelling. Sperm cells rounded to ovoid-shaped. Spicules 39  $\mu\text{m}$  long, fine, arcuate, with an offset knob-like capitulum. Gubernaculum 12  $\mu\text{m}$  long, largely parallel with the spicules, and distally with a lateral wing, proximally with short double end. Three pairs of short, bent, anal setae: one posterior to the cloacal aperture.

Posterior adhesion tubes broad at base; all PAT inserted anterior to the cloacal opening. Eight SIAT (left side) to nine SIAT (right side); alternating relatively short and very long slender tubes, intermingled by minute setae except for a longer seta inbetween SIAT1 and SIAT2. Eight pairs of SvAT; anterior three pairs short (11–13  $\mu\text{m}$ ) and stiff, posteriorly tubes becoming somewhat longer and slenderer (Fig. 3 A). Anterior to PAT two subventral rows and two sublateral rows of respectively 6–8 and 3 long stout, posteriorly directed somatic setae.

Tail largely annulated; on right side annules laterally interrupted. Non-annulated tail end short, 27.5 % of total tail length; its cuticle punctated; with a single pair of sublateral somatic setae.

#### Female.

Similar to male in most respects. Amphidial fovea elongated unispiral (18  $\mu\text{m}$  long), shorter than in male (Fig. 3 C).

Reproductive system didelphic-amphidelphic, with both branches reflexed to the right side. No spermathecae observed. Vagina 13.5  $\mu\text{m}$  long, consisting of a short (3.5  $\mu\text{m}$ ), well cuticularized distal part, separated by a thin mid-portion from a thicker but weaker cuticularized proximal part (10  $\mu\text{m}$ ). Vulva in anterior body half. No paravulvar setae present.

Posterior adhesion tubes with 12 pairs of SIAT, two of them on tail, and five pairs of SvAT. SIAT with long and short tubes alternating, and intermingled with minute somatic setae; SvAT becoming shorter posteriorly. Anterior to PAT two longitudinal subventral rows and two sublateral rows with 6–7 long (23  $\mu\text{m}$ ), stiff setae, posteriorly directed (Fig. 3 D).

Non-annulated tail end slender, 55 % of total tail; its cuticle punctated and provided with a pair of sublateral and one to two pairs of subventral somatic setae (Fig. 3 D). Caudal glands well developed, extending beyond the anus.

#### Juveniles.

First and second stages unknown.

#### Fourth stage juvenile.

In most respects similar to adult. Swollen pharyngeal region 24 % of total body length. Head with four CAT, one sublateral pair and one subdorsal pair. Subcephalic setae present. Amphidial fovea 16  $\mu\text{m}$  long, unispiral, ventrally coiled.

In a moulting specimen genital tract and copulatory apparatus completely formed; spicules of future male 39  $\mu\text{m}$  long.

Posterior adhesion tubes in four longitudinal rows: seven pairs of SIAT, three pairs of SvAT. SIAT with alternating shorter and longer tubes, intermingled with short somatic setae. Anterior to PAT three longitudinal rows with long stout, posteriorly directed somatic setae, one ventral row of five setae and two ventrosublateral rows of three setae. Non-annulated, punctated tail end 57 % of total tail; with one pair of short subventral setae. In a moulting male specimen non-annulated tail end 28 % of total tail length.

#### Third stage juvenile.

Largely resembling adult and fourth stage juvenile. Swollen pharyngeal region 25 % of total body length; behind narrow neck region body about equally wide up to the anal region; tail tapering. Spiny cuticular ornamentation body annules less obvious than in other stages. Head with three CAT, one sublateral pair, one dorsal tube. Amphidial fovea 9.5  $\mu\text{m}$  long, large unispiral, ventrally coiled.

Genital reproductive system with two short branches (6.5–7  $\mu\text{m}$  long) of a few cells. Posterior adhesion tubes in two ventrosublateral longitudinal rows of five tubes; one on tail. PAT with alternating longer and shorter tubes, intermingled with short somatic setae.

Non-annulated, punctated tail end 63 % of total tail, provided with a short and a long (21  $\mu\text{m}$ ) pair of subdorsal setae and a 7.5  $\mu\text{m}$  long pair of sublateral setae.

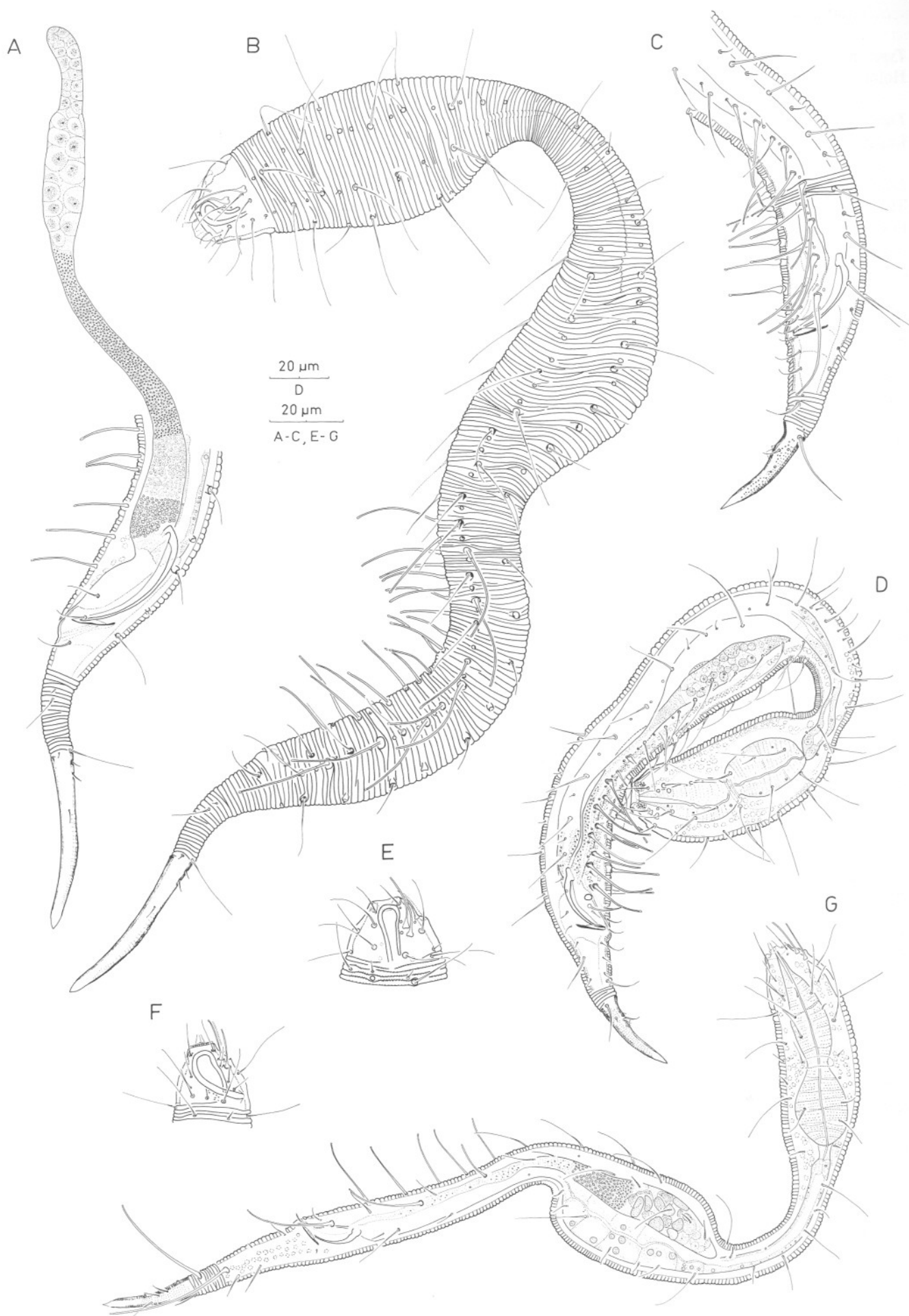
#### Diagnosis.

*Dracograllus laingensis* sp. n. is characterized by its habitus with a long gently swollen pharyngeal region; by the spiny ornamented body cuticle; by the presence of stiff posteriorly directed setae anterior to PAT; by the large amphidial fovea: inverted U-shape in male, elongated unispiral in female; by the length and shape of the copulatory apparatus in male and by the sexual dimorphism in tail shape and length of the non-annulated end.

#### Differential diagnosis.

*D. laingensis* sp. n. most closely resembles *D. grootaerti* and also *D. pusillus* (see description *D. grootaerti*) but, apart from the cuticular ornamentation, differs from them by the diagnostic characters given above.

Fig. 4. – *Dracograllus spinosus* sp. n. – Holotype male: A. Reproductive system and tail, partly in surface view. – B. Habitus, surface view. *Dracograllus pusillus* sp. n. Holotype male: – D. Habitus. – E. Surface view of head. *Dracograllus minutus* sp. n. Holotype male: – F. Surface view of head. – G. Habitus.



*Dracograllus minutus* sp. n. (Fig. 4 F-G)*Type specimens :*

Holotype male, slide RIT 170.

*Type locality :*

Laing Island, sample 1256 (see Material and Methods).

*Etymology :*

The specific name *minutus* (Latin, meaning small) refers to its small body size and short spicules.

## MEASUREMENTS :

*Holotype male.*

L = 290, CAT = 13, cs = 9.5, hw = 20, Ph = 57, mbd Ph = 23, (mbd) = 14, mbd = 29, t = 59, ABD = 13, tmr = 24, SIAT1 = 17, SIAT2 = 22, SIAT3 = 26, SIAT4 = 35, SIAT5 = 31, SvAT1 = 31, SvAT2 = 18, spic = 18, gub = 8.5; a = 10.0, b = 5.1, c = 4.9, c' = 4.5. No SIAT = 5, No SvAT = 2-3, No CAT = 6.

## DESCRIPTION

*Male.*

Body small, shape typical of the genus; mid-body conspicuously swollen (Fig. 5 A). Swollen pharyngeal region 22 % of total body length.

Annulation body cuticle with faint spiny ornamentation in swollen body regions. Somatic setae in eight longitudinal rows in pharyngeal region, long (17  $\mu$ m subdorsally) and short setae (4.5  $\mu$ m) more or less alternating; inserion with marked cuticular collar.

Rostrum without ornamentation, anterior border fringing; numerous subcephalic setae present. Lip region slightly withdrawn; six labial setae (3.5  $\mu$ m long) (Fig. 4 F). Six CAT: two sublateral pairs and a single subdorsal pair, arranged in anterior half of rostrum. Amphidial fovea very large loop-shaped, ventrally whirled.

Pharynx dumb-bell shaped; cardia short; intestine cylindrical and enlarged at mid-body.

Reproductive system typical of the Draconematidae, testis reaching to narrow neck region; situated ventrally from intestine. Short germinative and growth zones; vesicula seminalis with relatively large sperm cells. Spicules 18  $\mu$ m long, arcuate; corpus strongly tapered to a pointed end; offset capitulum (Fig. 5 A). Gubernaculum 8.5  $\mu$ m long, parallel to the spicules. Three pairs of short curved anal setae (5-5.5  $\mu$ m long): one pair anterior to the cloacal opening, one at its level and one pair posterior to it.

Posterior adhesion tubes with five pair of SIAT, two of which posterior to the cloacal opening, and two SvAT (left), three SvAT (right). PAT very slender, lengthening posteriorly; caudal adhesion tubes conspicuously elongated. Anterior to PAT two longitudinal subventral rows of about three long (15  $\mu$ m) somatic setae, tighter and posteriorly directed.

Non-annulated tail end, punctated except at tip; 41 % of total tail; provided with two pairs of subventral setae, one

subdorsal seta on the left side and two pairs of minute subventral tubercles in front and behind the subventral setae.

*Female and juvenile stages :*

Not found.

*Diagnosis :*

*Dracograllus minutus* sp. n. is characterized by its habitus and small body size; by the presence of only six CAT; by the number, length and shape of the PAT (five pairs of SIAT, 2-3 SvAT) and by the small arcuate and cephalated spicules.

*Remarks :*

*Dracograllus minutus* sp. n. is the smallest known species of the genus, possessing the shortest spicules (18  $\mu$ m long) and the lowest number of CAT in adults. However, the amphidial fovea are the largest ever found among *Dracograllus* species.

*Dracograllus papuensis* sp. n. (Fig. 5 A-H)*Type specimen :*

Holotype female, slide RIT 171. Paratypes : 1 ♂, slide RIT 180; 10 ♀, slides RIT 173-174, RIT 176-178, RIT 180-183, 1 ♀ in UCNC and 2 juv., slides RIT 175, RIT 179.

*Type locality :*

Laing Island, sample 1255 (see Material and Methods).

*Other localities :*

Laing Island, sample 1256, sample 1267.

*Etymology :*

The specific name *papuensis* refers to Papua New Guinea.

## MEASUREMENTS

*Holotype female.*

L = 410, CAT = 18, cs = 12, hw = 28, Ph = 71, mbd Ph = 42, (mbd) = 13, mbd V = 50, t = 83, ABD = 13, tmr = 63, SIAT1 = 16, SIAT2 = 17, SIAT3 = 17, SIAT4 = 15, SIAT5 = 18, SIAT6 = 14, SIAT7 = 16, SIAT8 = 13, SIAT9 = 16, SIAT10 = 14, SIAT11 = 16, SIAT12 = 17, SvAT1 = 14, SvAT2 = 12, SvAT3 = 12, SvAT4 = 12, SvAT5 = 11, SvAT6 = 10, SvAT7 = 11, SvAT8 = 10, SvAT9 = 11, SvAT10 = 11, SvAT11 = 12, V = 46 %; a = 8.2, b = 5.8, c = 4.9, c' = 6.4. No SIAT = 12, No SvAT = 11, No CAT = 8.

*Paratype female (n = 7).*

L = 350-400 (375), CAT = 12-17, cs = 7.5-11, hw = 24-26, Ph = 69-74, mbd Ph = 32-40, (mbd) = 11-13, mbd V = 39-56, t = 66-74, ABD = 12-15, tmr = 46-56, SIAT1 = 13-16, SIAT2 = 13-17, SIAT3 = 14-17, SIAT4 = 11-16, SIAT5 = 12-16, SIAT6 = 11-16, SIAT7 = 10-16, SIAT8 = 11-17, SIAT9 = 11-16, SIAT10 = 11-18, SIAT11 = 12-17, SIAT12



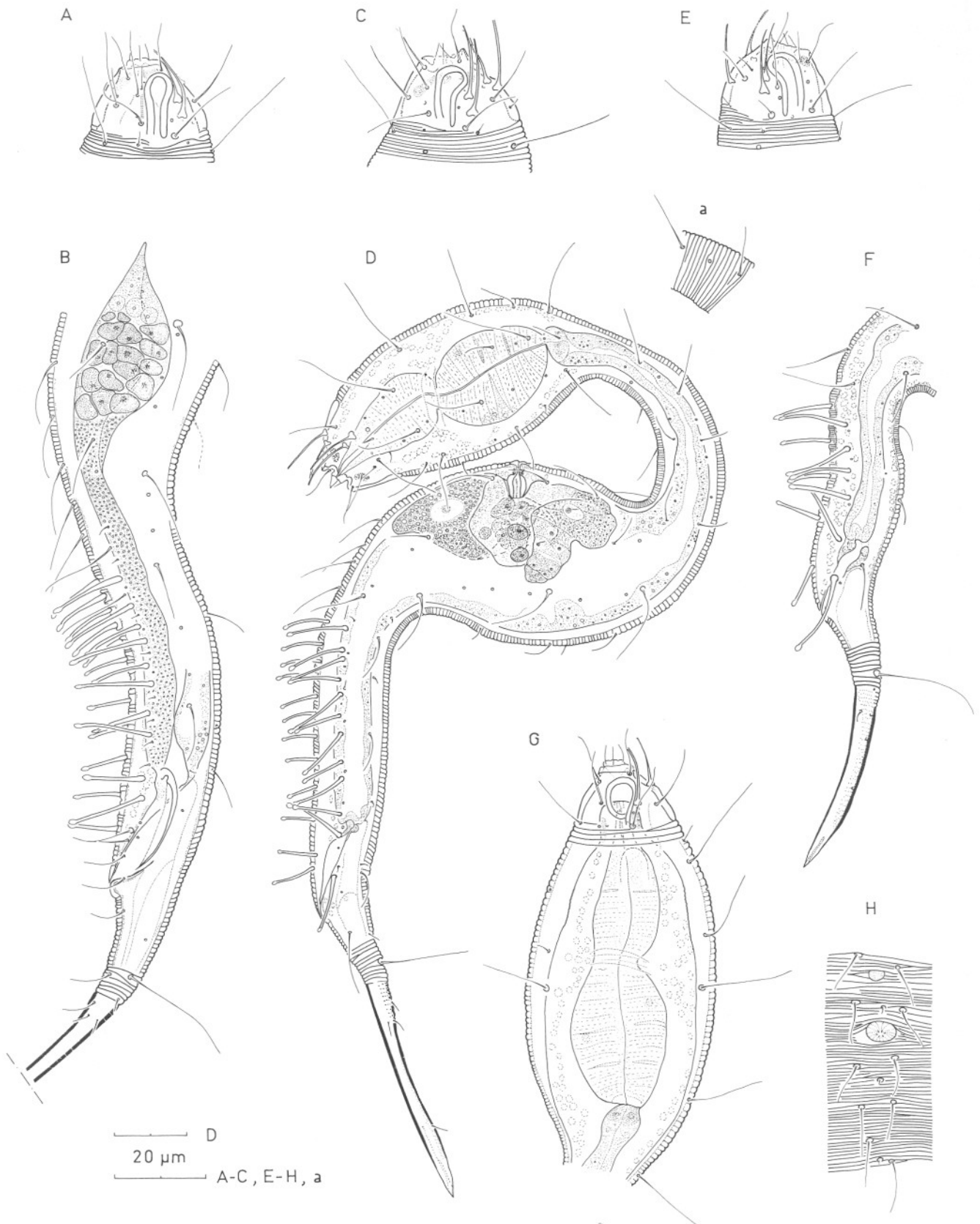


Fig. 5. – *Dracograllus papuensis* sp. n. - A. Surface view of head (paratype ♂). - B. Male reproductive system and tail (paratype). Holotype female : - C. Surface view of head. - D. Habitus. - E. Surface view of head (paratype ♀). - F. Posterior body region in fourth stage juvenile (paratype). - G. Anterior body region in fourth stage juvenile, moulting into female (paratype). - H. Surface view of vulvar region (paratype).

= 14-17, SIAT13 = 14-16, SvAT1 = 11-14, SvAT2 = 9.5-13, SvAT3 = 9-12, SvAT4 = 8-14, SvAT5 = 8-11, SvAT6 = 7.5-10, SvAT7 = 8.5-11, SvAT8 = 7-11, SvAT9 = 8.5-11, SvAT10 = 9.5-11, SvAT11 = 9.5-12, V = 46-53 %; a = 7.0-10.0, b = 4.9-5.8, c = 4.6-6.0, c' = 4.7-6.4, No SIAT = 11-13, No SvAT = 9-11, No CAT = 8.

*Paratype male* (n = 1).

L' = 310, CAT = 20, cs = 12, hw = 26, Ph = 62, mbd Ph = 40, (mbd) = 14, mbd = 40, ABD = 15, t without tmr = 25, spic = 29, gub = 9, SIAT1 = 18, SIAT2 = 18, SIAT3 = 15, SIAT4 = 18, SIAT5 = 15, SIAT6 = 18, SIAT7 = 15, SIAT8 = 18, SIAT9 = 14, SIAT10 = 17, SvAT1 = 14, SvAT2 = 14, SvAT3 = 12, SvAT4 = 11, SvAT5 = 10, SvAT6 = 10, SvAT7 = 9, SvAT8 = 9, SvAT9 = 10, SvAT10 = 11, SvAT11 = 11. No SIAT = 10, No SvAT = 11, No CAT = 8.

*Paratype juveniles.*

*Fourth stage juvenile moulting into adult female* (n = 1).

L = 370, CAT = 14, cs = 11, hw = 21, mbd Ph = 41, (mbd) = 16, mbd = 40, t = 73, ABD = 15, SIAT1 = 16, SIAT2 = 17, SvAT1 = 11, SvAT2 = 11. No SIAT = 6, No SvAT = 5, No CAT = 4.

*Fourth stage juvenile* (n = 1).

L = 275, CAT = 14, cs = 10, hw = 22, Ph = 61, mbd Ph = 32, (mbd) = 13, mbd = 29, t = 57, ABD = 11, tmr = 41, SIAT1 = 16, SIAT2 = 16, SIAT3 = 13, SIAT4 = 14, SIAT5 = 18, SIAT6 = 18, SvAT1 = 13, SvAT2 = 11, SvAT3 = 9.5, SvAT4 = 11, SvAT5 = 11; a = 8.6, b = 4.5, c = 4.8, c' = 5.2. No SIAT = 6, No SvAT = 5.

DESCRIPTION

*Females.*

Body small, finely annulated; shape typical of the genus; conspicuously swollen mid-body. Swollen pharyngeal region mainly 22-23 % of total body length (18 % in holotype). Arrangement somatic setae typical of the genus, with long (13-23  $\mu$ m) and short (1.5-4.5  $\mu$ m) setae more or less alternating; insertion with cuticular collar.

Rostrum wider than long, lip region usually withdrawn. Six labial sensory setae, 3-4.5  $\mu$ m long; six associated granular glands visible.

Four fine cephalic setae, 7.5-12  $\mu$ m long. Eight CAT: two sublateral and two subdorsal pairs, arranged in two transverse rows with sublateral pair about halfway along the amphidial fovea (Fig. 5 C-E). Amphidial fovea, large loop-shaped, 14-16  $\mu$ m long, extending from level cephalic setae to posterior head end: dorsal arm slightly longer than ventral one.

Pharynx dumb-bell shaped. Cardia short, 4.5  $\mu$ m long. Intestine cylindrical, enlarged at mid-body.

Reproductive system didelphic-amphidelphic, with reflexed ovaries, both to the same side of to opposite sides; anterior branch to the left, posterior to the right side (Fig. 5 D, holotype) or the reverse in some paratypes. No spermathecae observed; large sperm cells in uterus. Genital

system largely ventral to the intestine except for the gonads which may be partly flank the intestine to the right of left side. Vagina 11-12  $\mu$ m long, with a 3-3.5  $\mu$ m long thin distal part often surrounded by granular concentrations and a thick-walled proximal part.

Vulva oval in ventral view, 4.5-6  $\mu$ m in diameter, with a pore-like opening. Paravulvar setae minute: two ventral posterior and one anterior to the vulva (Fig. 5 H).

Posterior adhesion tubes with pronounced bell-shaped end: 11-13 pairs of SIAT, 9-11 pairs of SvAT. PAT relatively short, SvAT shorter than SIAT; only small differences in length among themselves. All SIAT anterior to the anus; intermingled with minute somatic setae.

Non-annulated tail end long and slender, 65-76 % of total tail; its cuticle dorsally to dorsolaterally perforated; provided with short somatic setae (three subdorsal pairs, one lateral pair in holotype). Caudal glands extending in front of anus.

*Male.*

Similar to female in most respects. Reproductive system typical of Draconematidae; single testis reaching up to beginning of widened mid-body region. Germinative and growth zones short, vesicula seminalis with rounded rectangular sperm cells (3-3.5 by 6  $\mu$ m) and a small nucleus (2  $\mu$ m). Spicules 29  $\mu$ m long; corpus slightly arcuated, with small ventral apophysis near offset capitulum (Fig. 5 B).

Gubernaculum, thin, 9  $\mu$ m long, parallel to the spicules. Four pairs of anal setae, 7.5-10  $\mu$ m long, two pairs anterior, one at the level and one posterior to the cloacal aperture (Fig. 5 B); an additional anal seta posterior to the cloacal opening at right body side.

Posterior adhesion tubes all anterior to the anus: ten pairs of SIAT and eleven pairs of SvAT. SIAT intermingled with minute somatic setae; longer somatic setae (16-18  $\mu$ m) between SIAT1 and SIAT2, in front of SIAT1 and behind the posteriormost pair of SIAT. Anterior to the PAT are two subventral longitudinal rows of 7-9 posteriorly directed, relatively stiff somatic setae (18  $\mu$ m long).

Tail with terminal part of non-annulated end broken off.

*Juveniles.*

First, second and third stages not found.

*Fourth stage juveniles.*

In most respects similar to adults. Swollen pharyngeal region about 25 % of total body length.

Head with four CAT: two sublateral and two subdorsal pairs. Amphidial fovea a large closed loop, ventrally coiled, extending from cephalic setae to posterior head end. In a juvenile female specimen reproductive system 14  $\mu$ m long. In a moulting female specimen reproductive system short but completely formed; both branches reflexed.

Posterior adhesion tubes all anterior to the anus; six pairs of SIAT and five pairs of SvAT. Anterior to PAT a single ventral row of four posteriorly directed, stiff somatic setae (15  $\mu$ m long).

Non-annulated tail end, 72 % of total tail; its cuticle dorsally to laterally perforated; short somatic setae present:

one subventral pair and three subdorsal pairs (may be broken off).

#### Diagnosis.

*Dracograllus papuensis* sp. n. is mainly characterized by its habitus and finely annulated body cuticle; by the long inverted U-shaped amphidial fovea; by the slender elongated tail with long, narrow non-annulated end, and in male by the length and shape of the copulatory apparatus.

#### Differential diagnosis.

*Dracograllus papuensis* sp. n. resembles *D. filipjevi* ALLEN & NOFFSINGER, 1977 in number of CAT and PAT, and the presence of somatic setae with insertion collar. It differs mainly by the shape of the amphidial fovea; by the finely annulated body cuticle; by the sperm structure; by the shape of the spicules; by a shorter body and spicule length, by a smaller c-value; by the narrow elongated non-annulated tail end; by a shorter more swollen pharyngeal region with more pronounced dumb-bell shape of the pharynx, and by the position of the PAT all anterior to the anus instead of one postanally in females of *D. filipjevi*.

*Dracograllus pussilus* sp. n. (Fig. 4 C-E)

#### Type specimens :

Holotype male, slide RIT 187.

#### Type locality :

Laing Island, sample 1255 (see Material and Methods).

#### Etymology :

The specific name *pussilus* (Latin *pussilus*, meaning small size) refers to the small body size and the short spicules.

#### MEASUREMENTS

##### Holotype male.

L = 310, CAT = 15, hw = 26, Ph = 64, mbd Ph = 35, (mbd) = 12, mbd = 35, t = 51, ABD = 16, tmr = 28, spic = 26, gub = 11, SIAT1 = 21, SIAT2 = 23, SIAT3 = 17, SIAT4 = 25, SIAT5 = 17, SIAT6 = 25, SIAT7 = 17, SIAT8 = 26, SIAT9 = 20, SIAT10 = 30, SvAT2 = 15, SvAT3 = 15, SvAT4 = 16, SvAT5 = 15, SvAT6 = 16; a = 8.9, b = 4.8, c = 6.1, c' = 3.2. No SIAT = 10, No SvAT = 6, No CAT = 8.

#### DESCRIPTION

##### Male.

Body small, rather stout; swollen pharyngeal region 24 % of the total body length and as wide as mid-body region. Annulation body cuticle with a faint ornamentation of dot-like punctations at ring edges in the pharyngeal region (Fig. 4 E); annules with fringing borders in anterior mid-body region. Somatic setae (23  $\mu$ m dorsally) arranged as typical of the Draconematidae; insertion with marked cuticular

collar. Benaeth the body cuticle runs over the whole body a thin granular layer.

Rostrum 1.4 times as wide as long with faint subcuticular markings; lip region withdrawn. Four cephalic setae. Eight CAT adjacent to the amphidial fovea : two sublateral pairs and two more anteriorly inserted subdorsal pairs. Several subcephalic setae present.

Amphidial fovea long, inverted U-shaped, ventrally coiled; ventral arm slightly longer.

Pharynx clearly dumb-bell shaped; cardia 5.5  $\mu$ m long; intestine narrow, more or less cylindrical, running dorsally of the reproductive system.

Reproductive system typical of the Draconematidae; single testis reaching to the beginning of the widened mid-body. Sperm cells granular (7 by 8.5  $\mu$ m), nucleus small (2  $\mu$ m). Spicules short (26  $\mu$ m), curved; a knob-like capitulum. Gubernaculum thin, straight trough-shaped structure, 11  $\mu$ m long. Anal setae present : two anterior, one posterior to the cloacal opening.

Posterior adhesion tubes slender, all anterior to the cloacal opening; ten pairs of SIAT and six pairs of SvAT. SIAT with alternating shorter and longer tubes, not intermingled with long somatic setae except for one long seta between SIAT1 and SIAT2, only with minute setae besides them. Six pairs of stiff, posteriorly directed subventral somatic setae (14  $\mu$ m long), just anterior to PAT.

Non-annulated tail end, 55 % of total tail; its cuticle punctated, ventrally with slight bulge near insertion of a pair of short subventral setae; two short subventral, one short setae and one pair of long sublateral setae are present. Caudal glands shortly extending anteriorly beyond the cloacal opening.

#### Diagnosis.

*Dracograllus pussilus* sp. n. is characterized by its habitus : short and stout body with annulated cuticle provided with a spiny ornamentation; by the broad head, by the stiff subventral setae anterior to PAT; by length and shape of the copulatory apparatus with slightly bent spicules (26  $\mu$ m long), and by the long non-annulated tail end with ventral bulge.

#### Differential diagnosis.

*Dracograllus pussilus* sp. n. resembles *D. laingensis* in body cuticle, PAT and amphidial fovea.

*Dracograllus spinosus* sp. n. (Fig. 4 A-B)

#### Type specimens :

Holotype male, slide RIT 181.

#### Type locality :

Laing Island, sample 1256 (see Material and Methods).

#### Etymology :

The specific name *spinosus* (Latin, meaning with spines) refers to the presence of short spines at the insertion collar of most somatic setae in the posterior body region.

## MEASUREMENTS

*Holotype male.*

L = 340, CAT = 19, cs = 9, hw = 24, Ph = 81, mbd Ph = 39, (mbd) = 13, mbd = 40, t = 83, ABD = 17, tmr = 49, spic = 45, gub = 12, SIAT1 = 27, SIAT2 = 27, SIAT3 = 26, SIAT4 = 29, SIAT5 = 19, SIAT6 = 28, SIAT7 = 27, SIAT8 = 28, SvAT1 = 22, SvAT2 = 19, SvAT3 = 18, SvAT4 = 19, SvAT5 = 18, SvAT7 = 20, SvAT8 = 19, SvAT9 = 19, SvAT10 = 21, SvAT11 = 22; a = 8.5, b = 4.2, c = 4.1, c' = 4.9. No SIAT = 8, No SvAT = 10, No CAT = 8.

## DESCRIPTION

*Male.*

Body small; habitus typical of the genus; mid-body as wide as swollen pharyngeal region. Annulation of the body cuticle without ornamentation, except at slender neck region with narrow longitudinal lateral differentiation (Fig. 4 B). Somatic setae in eight longitudinal rows; alternating long and short setae, with marked cuticular collar (1.5-2  $\mu$ m) at insertion. From mid-body, on several somatic setae with spiny cuticular insertion collar, conspicuous spine (2.5-3  $\mu$ m) dorsally at collar of long somatic setae inserted ventrosilaterally just anterior to SIAT and in between them (Fig. 4 A).

Head with protruding lip region; six fine labial setae (3.5  $\mu$ m) with six associated granular glands. Four cephalic setae, 9  $\mu$ m long, at border helmet. Eight CAT: two pairs of dorsolateral and two pairs of subdorsal tubes. Large amphidial fovea, oblique loop-shaped by position of sub-lateral CAT; ventrally whirled; ventral arm slightly longer than dorsal arm.

Pharynx dumb-bell shaped, surrounded by numerous nuclei.

Reproductive system with single testis reaching beginning of swollen mid-body. Sperm cells, 3.5-5 by 4.5-6.5  $\mu$ m long with granular nucleus, 3.5  $\mu$ m diameter (Fig. 4 A). Spicules 45  $\mu$ m long, slender, arcuated; small capitulum. Gubernaculum, a 12  $\mu$ m long thin structure with small lateral wings; parallel to the spicules. Three pairs of anal setae: two anterior and one posterior to the cloacal opening.

Posterior adhesion tubes very slender; all anterior to the cloacal opening; eight pairs of SIAT and ten pairs of SvAT. Anterior to PAT two subventral longitudinal rows of 5-6 stiff, posteriorly directed somatic setae (20  $\mu$ m long).

Tail slender; non-annulated end 59 % of total tail; its cuticle perforated in posterior half; two pair of short sub-dorsal setae and two ventro-sublateral setae. Terminal pair

of long subdorsal somatic setae inserted on last tail ring. Caudal glands extending shortly in front of cloaca.

*Female and juveniles.*

Not found.

*Diagnosis.*

*Dracograllus spinosus* sp. n. is characterized by the conspicuous spiny ornamentation at the insertion base of several somatic setae in the posterior body region; by the number and shape of PAT: very slender, with 9 pairs of SIAT, 10 pairs of SvAT; by the presence of a lateral differentiation of the body cuticle at the narrow neck region; by the structure of the loop-shaped amphidial fovea, and by length and shape of the copulatory apparatus.

*Dracograllus demani* ALLEN & NOFFSINGER, 1977  
(Fig. 6 A-M)

*Material:*

1 ♂, 3 ♀, 1 juv. from Laing Island; 2 ♂, 2 ♀, 1 juv. from Duangit Reef.

*Localities:*

Laing Island, samples 1256, 1266, 1267 of 1982, sample 23 of 1977; Hansa Bay, Duangit Reef, nr 127 of 1979 (see Material and Methods).

## MEASUREMENTS

*Specimens from Long Island.**Male (n = 1).*

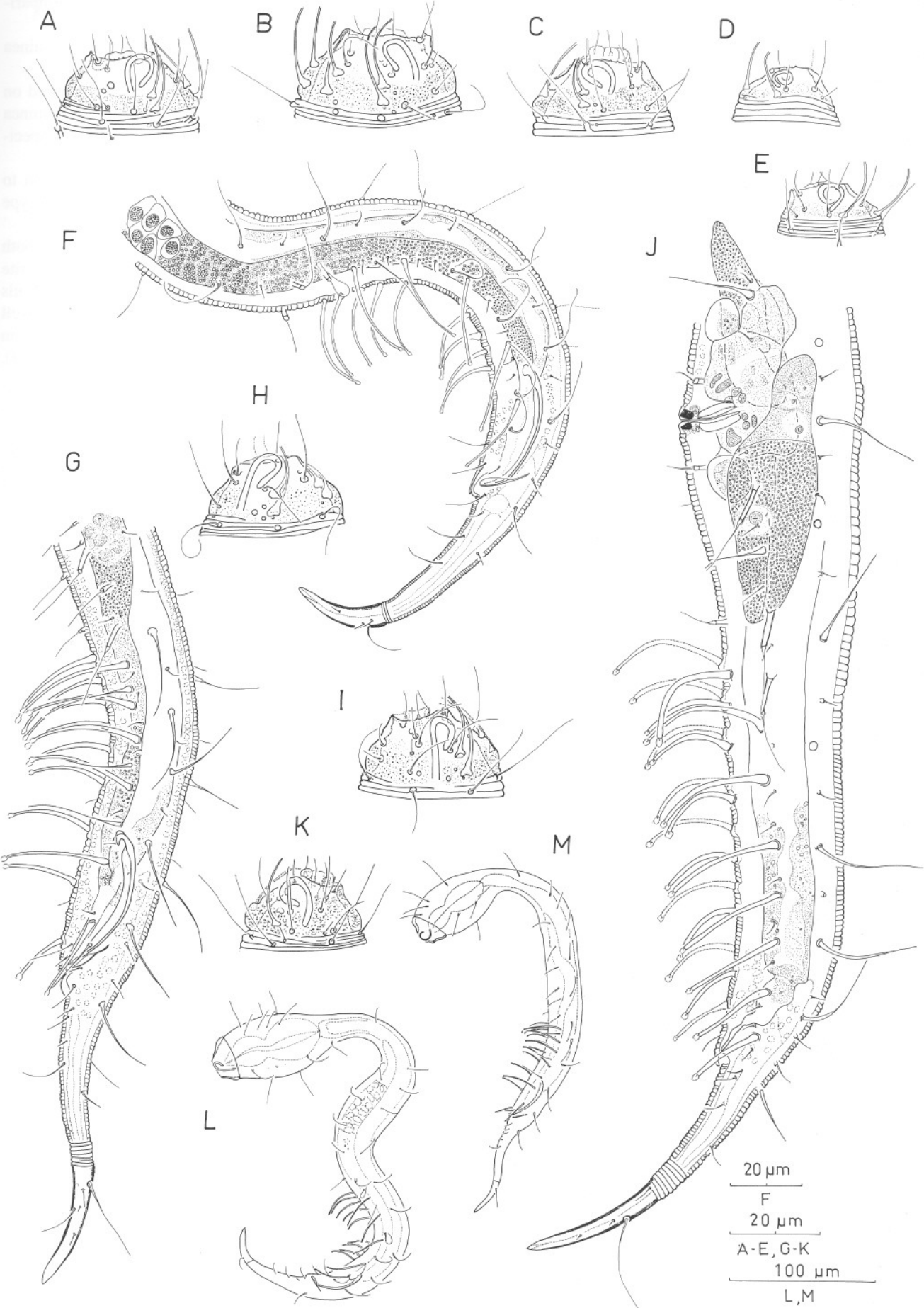
L = 350, CAT = 17, cs = 6, hw = 27, Ph = 60, mbd Ph = 37, (mbd) = 16, mbd = 24, t = 40, ABD = 14, tmr = 30, SIAT1 = 30, SIAT2 = 29, SIAT3 = 27, SIAT4 = 28, SIAT5 = 26, SIAT6 = 22, SvAT1 = 29, SvAT1 = 18, spic = 37, gub = 13; a = 9.5, b = 5.8, c = 8.8, c' = 2.9. No SIAT = 6, No SvAT = 9, No CAT = 8.

*Females (n = 3).*

L = 385-425, CAT = 17-19, cs = 6-6.5, hw = 28-32, Ph = 65-72, mbd Ph = 41-44, (mbd) = 16-19, mbd V = 36-47, t = 62-73, ABD = 13-14, tmr = 30-39, SIAT1 = 31-33, SIAT2 = 29, SIAT3 = 29-31, SIAT4 = 27-30, SIAT5 = 24-29, SIAT6 = 22-25, SIAT7 = 18-22, SvAT1 = 28-31, SvAT2 = 23-29, SvAT3 = 22-27, SvAT4 = 22-26, SvAT5 = 21-26, SvAT6 = 19-24, SvAT7 = 17-21, SvAT8 = 15, SvAT9 = 20, V = 41.5-46 %; a = 9.0-9.8, b = 5.6-6.2, c = 5.8-6.2, c' = 4.8-5.2. No SIAT = 6-7, No SvAT = 7-9, No CAT = 8.

Fig. 6. - *Dracograllus demani* ALLEN & NOFFSINGER, 1977. Surface views of head: - A. Female (L.I.). - B. Female (D.R.). - C. Female (L.I.). - D. Third stage juvenile (D.R.). - E. Fourth stage juvenile (L.I.). - H. Male (D.R.). - I. Male (D.R.). - K. Male (L.I.). Posterior body region in male: - F. ♂ D.R. - G. ♂ L.I. - J. Female reproductive system and posterior body region (L.I.). Habitus: - L. Male (D.R.). - M. Male (L.I.).





*Fourth stage juvenile* (n = 1).

L = 335, CAT = 16, hw = 24, Ph = 55, mbd Ph = 39, (mbd) = 16, mbd = 25, t = 64, ABD = 25, tmr = 29, SIAT1 = 30, SIAT2 = 28, SIAT3 = 27, SIAT4 = 26, SIAT5 = 20, VAT1 = 28, VAT2 = 25, VAT3 = 25, VAT4 = 21, VAT5 = 16; a = 8.6, b = 6.1, c = 5.2, c' = 5.8. No SIAT = 5, No SvAT = 5, No CAT = 3.

*Specimens from Duangit Reef**Males* (n = 2).

L = 425-475, CAT = 16, cs = 9, hw = 29-30, Ph = 76, mbd Ph = 41-43, (mbd) = 16-18, mbd = 35-36, t = 69-71, ABD = 14, tmr = 22-25, spic = 41-42, gub = 15-16, SIAT1 = 26-27, SIAT2 = 21-29, SIAT3 = 26, SIAT4 = 19-27, SIAT5 = 25-26, SvAT1 = 30, SvAT2 = 26, SvAT3 = 24-25, SvAT4 = 23-24, SvAT5 = 23, SvAT6 = 20-21, SvAT7 = 19-20, SvAT8 = 19-20, SvAT9 = 21-22; a = 9.9-11.6, b = 5.6-6.3, c = 6.2-6.7, c' = 4.9-5.1. No SIAT = 5, No SvAT = 9, No CAT = 8.

*Females* (n = 2).

L = 415-505, CAT = 20-22, cs = 5.5-9, hw = 35-36, Ph = 85-91, mbd Ph = 45-52, (mbd) = 18, mbd V = 36-51, t = 69-75, ABD = 15-17, tmr = 34-35, SIAT1 = 30-33, SIAT2 = 34-41, SIAT3 = 33-34, SIAT4 = 32-41, SIAT5 = 31-34, SIAT6 = 30-31, SIAT7 = 24-28, SvAT1 = 32-34, SvAT2 = 31, SvAT3 = 28-31, SvAT4 = 24-30, SvAT5 = 26-30, SvAT6 = 26-30, SvAT7 = 27, SvAT8 = 26-27, SvAT9 = 26, SvAT10 = 24, SvAT11 = 18, V = 45.5-47 %; a = 9.2-9.7, b = 4.9-5.5, c = 6.0-6.7, c' = 4.4-4.6. No SIAT = 7, No SvAT = 11, No CAT = 8.

*Third stage juvenile* (n = 1).

L = 265, CAT = 15, cs = 5.5, Ph = 56, mbd Ph = 30, (mbd) = 14, mbd = 21, t = 48, ABD = 12, tmr = 23, PAT1 = 24, PAT2 = 22, PAT3 = 24, PAT4 = 17, PAT5 = 20; a = 8.8, b = 4.7, c = 5.5, c' = 4.0. No PAT = 5, No CAT = 3.

*Remarks.*

Some variability in measurements and in number of PAT was found between specimens from both localities in Papua New Guinea and between the type specimens. The specimens from Papua New Guinea, especially those from Laing Island (L.I.), are: shorter than the type specimens; have shorter PAT; shorter spicules [37  $\mu$ m (L.I.), 41-42  $\mu$ m (D.R.)] against 43-53  $\mu$ m in types, and longer non-annulated tail end in male.

Apart from the males of Duangit Reef (D.R.), the specimens from Papua New Guinea have longer pedicels of the pedicel setae in front of the SIAT, 4-6.5  $\mu$ m in ♂ (Fig. 6 G), 6.5-8  $\mu$ m in ♀ (Fig. 6 J), 7  $\mu$ m in juv. from Laing

Island; 5  $\mu$ m in ♀ in juv. from Duangit Reef) in comparison with the type material (2-4  $\mu$ m).

The number of PAT of specimens from Papua New Guinea is in the range of the value of the type specimens.

Long terminal subdorsal somatic setae on tail inserted on non-annulated end in specimens from Papua New Guinea (Fig. F, G) against at the annulated tail region in type specimens.

Rostrum in the Papuan specimens broader in relation to its length, and its ornamentation stronger than in the type specimens.

Female reproductive system didelphic-amphidelphic, both branches reflexed to the same side (left) or to opposite sides (Fig. 6 J). No spermathecae observed; sperm cells present in uterus. Vagina with a short (3-4.5  $\mu$ m) well cuticularized distal part separated by a thin mid-part from a longer (9-10  $\mu$ m) thick-walled proximal part (Fig. 6 J).

*Dracograllus eira* (INGLIS, 1968)

ALLEN & NOFFSINGER, 1977 (Figs. 7 A-E, 8 A-G)

*Material :*

1 ♂, 11 ♀, 1 juv. from Laing Island, sample 3343; 114 ♂, 71 ♀, 38 juv. from Talia Point, sample 23.

*Localities :*

Laing Island, sample 3343; Talia Point, sample 23.

*Additional information :*

A large number of specimens occurred in the sample from Laing Island. For the first time fourth, third and second stage juveniles are found.

## MEASUREMENTS

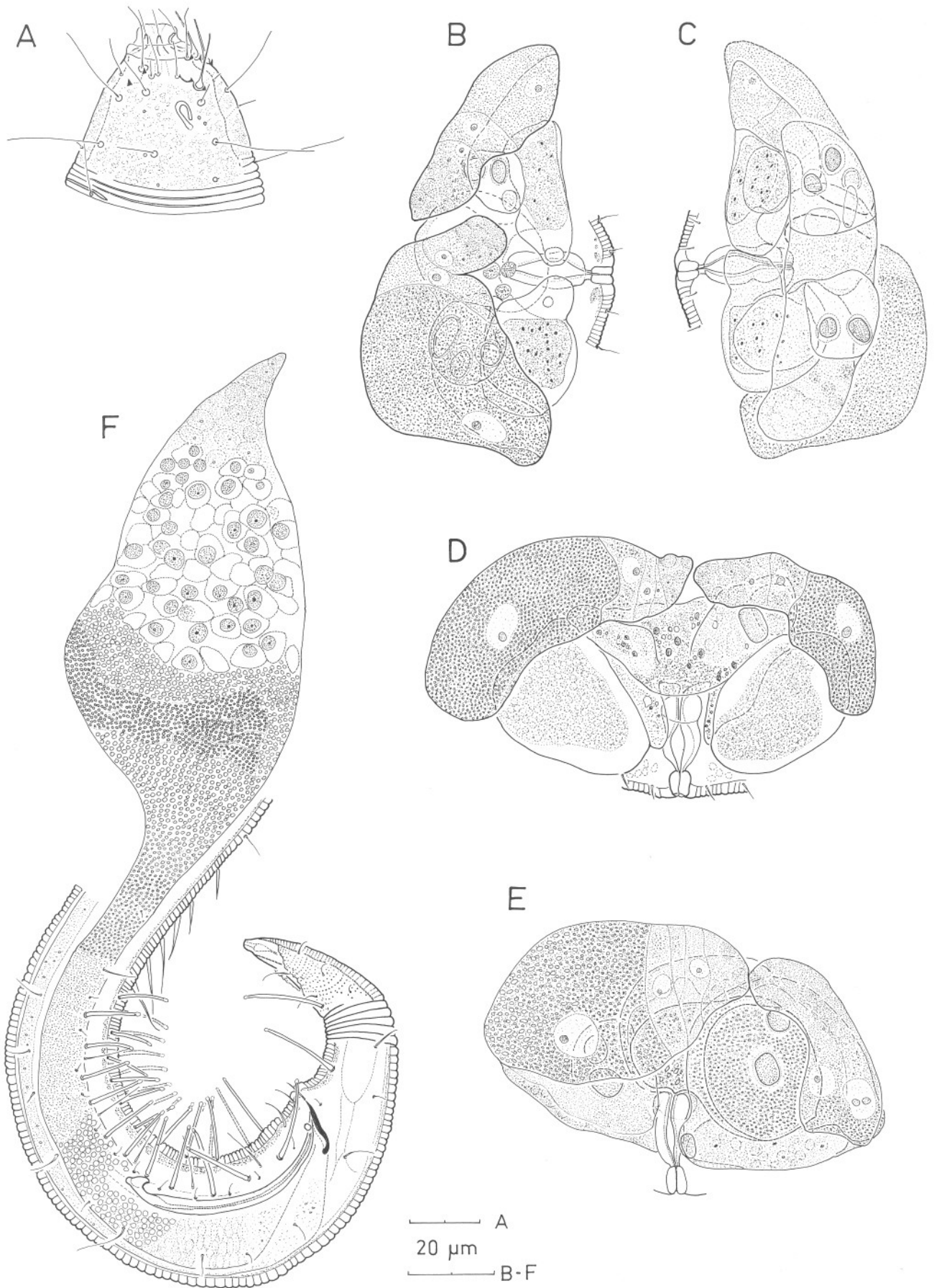
*Fourth stage juveniles* (n = 5).

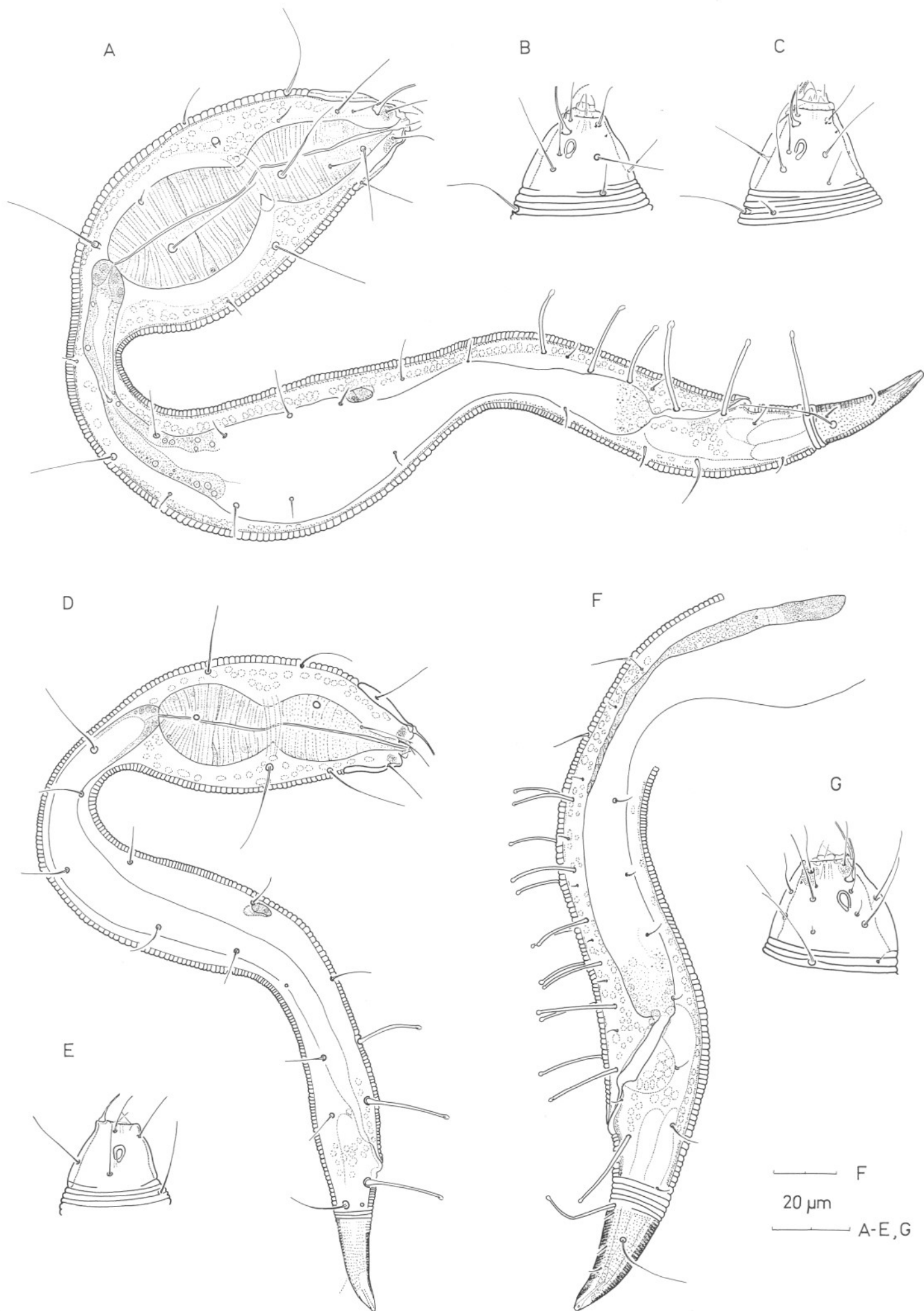
L = 455-650 (525), CAT = 14-16, cs = 10-13, hw = 35-40, Ph = 110-114, mbd Ph = 56-64, (mbd) = 15-20, mbd = 61-63, t = 55-66, ABD = 24-28, tmr = 32-42, SIAT1 = 18-27, SIAT2 = 21-23, SIAT3 = 18-20, SIAT4 = 20-23, SIAT5 = 26-27, SIAT6 = 23-26, SIAT7 = 26-28, SIAT8 = 24-27, VAT1 = 15-16, VAT2 = 14-19, VAT3 = 14-15, VAT4 = 14-18, VAT5 = 15-20, VAT6 = 17-22, VAT7 = 20; a = 7.1-10.7 (8.4), b = 4.1-5.8, c = 7.7-11.8, c' = 2-2.5. No SIAT = 8, No VAT = 7, No CAT = 4.

*Third stage juveniles* (n = 4).

L = 330-370, CAT = 12-13, cs = 8-12, hw = 28-29, Ph = 82-87, mbd Ph = 42-48, (mbd) = 13-19, mbd = 37-39, t = 49-55, ABD = 18-21, tmr = 30-33, PAT1 = 17-19, PAT2 = 16-21, PAT3 = 16-17, PAT4 = 21-24, PAT5 = 20-22, PAT6 = 13-24; a = 7.2-7.9, b = 4.0, c = 6.4-7.4, c' = 2.5-2.8. No PAT = 6, No CAT = 3.

Fig. 7. — *Dracograllus eira* (INGLIS, 1968). - A. Surface view of head female. Female reproductive system : - B. Right side of ♀ 1. - C. Left side of ♀ 1. - D. Left side of ♀ 2. - E. Left side of ♀; uterus with oocyte. - F. Male reproductive system and tail.







*Second stage juvenile* (n = 1).

L = 265, CAT = 9, cs = 10, hw = 24, Ph = 63, mbd Ph = 36, (mbd) = 12, mbd = 24, t = 36, ABD = 16, tmr = 24, PAT1 = 17, PAT2 = 22, PAT3 = 22; a = 7.4, b = 4.2, c = 7.4, c' = 2.3. No PAT = 3, No CAT = 1.

*Males* (n = 5).

L = 600-670 (630), CAT = 16-19, cs = 15, hw = 37-39, Ph = 126-141, mbd Ph = 54-57, (mbd) = 19-22, mbd = 61-82, t = 61-76, ABD = 27-30, tmr = 36-43, spic = 69-77 (72), gub 18-21, SIAT1 = 17-20, SIATl = 24-29, SvAT1 = 13-16, SvATl = 19-21; a = 7.9-9.9, b = 4.3-5.3, c = 8.8-9.8, c' = 2.3-2.5. No SIAT = 13-14, No SvAT = 9-10, No CAT = 8.

*Females* (n = 5).

L = 590-615, V = 50.5-53 %, t = 61-69, tmr = 46-48. No SIAT = 14-16, No SvAT = 8-10, No CAT = 8.

*Male.*

The Papuan specimens largely agree with the original description and the revision by ALLEN & NOFFSINGER (1977). They differ however, by a somewhat longer body (660-670 µm against 500-540 µm in types), by a longer copulatory with spicules 69-77 µm against 48-51 µm in the type specimens and by a longer non-annulated tail end 53-59 % of total tail against 48 % in type material.

Testis extending up to posterior end narrow neck region i.e. 38-44 % of total body length from anterior; germinative and growth zones short; vas deferens with pale sperm cells (7 by 9 µm) with a coarsely granular nucleus (3.5 by 4.5 µm) (Fig. 7 F).

*Female.*

The Papuan specimens agree with the type specimens except for the longer non-annulated tail end, 66.5-70.5 % of total tail against 41 % in single type specimen.

Reproductive system didelphic-amphidelphic, with re-flexed ovaries, usually both to the same side, left or right. Vagina bipartite: a short (5.5-7.5 µm) well cuticularized distal part and a long (25-33 µm) weaker proximal part. Vulva at mid-body; vagina leading to a central uterine sac, anteriorly and posteriorly bulging out on right and on left side. Two large sac-like structures (? spermathecae), flanking the vagina, are connected with the uterus near the oviduct. No sperms were ever observed in them; only sperm cells found in the uterus (Fig. 7 B-E).

*Juveniles.*

First stage juveniles not found.

*Fourth stage juveniles.*

In most respects similar to the adults. Swollen pharyngeal region about 27 % of total body length. Head with four

CAT, one sublateral and one subdorsal pair. Many subcephalic setae. Amphidial fovea as in adults, small loop-shaped; ventrally whirled, ventral arm near dorsal one, but slightly longer.

Posterior adhesion tubes in three longitudinal rows: eight pairs of SIAT, six to seven VAT. SIAT intermingled with short somatic setae (4.5 µm); becoming longer posteriorly; the two posterior pairs inserted on tail region; VAT also slightly longer posteriorly. Two stiff posteriorly directed ventral setae (15-18 µm) just before PAT.

In a juvenile female genital system (49 µm long), consisting of two branches with several cells; in young males reproductive system elongated, spicular primordium present.

Non-annulated punctated tail end, 54-63 % of total tail, provided with a pair of long dorsosublater setae (17 µm), 1-3 pairs of short ventrosublater setae (Fig. 8 F). Caudal glands extending far anteriorly.

*Third stage juveniles.*

Similar to adults for most characteristics. Swollen pharyngeal region (28-31 % of total body length) is widest body region instead of the mid-body region as in adults and fourth stage juveniles. Head with three CAT: one dorsal and one pair of dorsolateral tubes. few subcephalic setae. Amphidial fovea small loop-shaped as in former stages. PAT in two subventral longitudinal rows of six tubes, intermingled with short somatic setae; one pair of tubes postanally (Fig. 8 A). No stiff ventral setae anterior to PAT. Genital system consisting of two short (6.5 µm) branches of a few cells. Non-annulated, punctated tail end 60-67 % of total tail; with one long pair of lateral setae and one-two pairs of ventrosublater setae. Caudal glands extending far anteriorly.

*Second stage juvenile.*

Similar to former stages in many respects, but mid-body only 2/3rd as wide as swollen pharyngeal region (29 % of total body length). Head with a single dorsal CAT, inserted near anterior border of helmet. Amphidial fovea small loop-shaped as in the other stages; only few subcephalic setae on rostrum. Posterior adhesion tubes in two subventral longitudinal rows of three tubes each; one pair of PAT on tail. No stiff ventral setae in front of PAT. Reproductive system with two small branches of about three cells. Non-annulated punctated tail end 67 % of total tail; with a single dorsal insertion mark; seta probably broken off.

*Remark.*

In adults and in all juvenile stages minute spiny projections can often be observed near the insertion of CAT, the cephalic and some subcephalic setae (Figs. 7 A, 8 B, C).

▷ Fig. 8. — *Dracograllus eira* (INGLIS, 1968). *Third stage juvenile*: - A. Habitus. - B. Surface view of head. *Fourth stage juvenile*: - C. Surface view of head. - F. Reproductive system and posterior body region. - G. Surface view of head. *Second stage juvenile*: - D. Habitus. - E. Surface view of head.

Discussion

The genus *Dracograllus* with its 22 species, constitutes at present the largest genus of the Draconematinae. It can be distinguished from both other genera of the subfamily : *Draconema* COBB, 1913 and *Paradraconema* ALLEN & NOFFSINGER, 1977, respectively by the lack of prominently enlarged body annules anteriorly on swollen pharyngeal region; and by the absence of eyespots and sublateral cephalic acantiform setae on rostrum (1 exception *D. stekhoveni*).

The presence of pedical setae and of very fine PAT with clear differences in length among them as found in several species of *Dracograllus*, do not occur in both other genera of the subfamily.

Moreover, the amphidial fovea tend to be longer in the genus *Dracograllus*. The presence of subventral and ventral longitudinal rows of long, stiff, posteriorly directed somatic setae in front of PAT, present in some species of *Draconema* and *Paradraconema*, is common in *Dracograllus*.

Key to the species of *Dracograllus*

(see ALLEN & NOFFSINGER, 1977).

1. – Twelve to 15 CAT on rostrum 2  
– Six to 8 CAT on rostrum 5
2. – Without sublateral Ceph Acan-set on rostrum 3  
– With 1 pair of sublateral Ceph Acan-set on mid-rostrum  
*D. stekhoveni* ALLEN & NOFFSINGER, 1977
3. – Males with 3-4 preanal Corn-set; 10-11 CAT. Females with 10 CAT: No SIAT 18, No SvAT 13-16.  
*D. cornutus* sp. n.  
– Males without preanal Corn-set; more CAT. Females with larger number of PAT 4
4. – Males with 7-8 short stiff setae in subventral rows just anterior to SvAT1; spic = 39 µm. Females with 24 SIAT, 2 tubes posterior anus. Males and females length swollen pharyngeal region 22 % of L  
*D. gerlachi* ALLEN & NOFFSINGER, 1977  
– Males with 3-4 short stiff setae in subventral rows just anterior to SvAT1; spic = 71 µm. Females with 21 SIAT, 3 tubes posterior to anus. Males and females length swollen pharyngeal region 13-14 % of L  
*D. falcatus* (IRWIN-SMITH, 1918)
5. – Six CAT on rostrum; male with 5 SIAT, 2-3 SvAT, L = 290 µm, spic = 18 µm  
*D. minutus* sp. n.  
– Eight CAT on rostrum; in male number PAT larger, L and spic longer 6
6. – All CAT adjacent to or posterior to amphidial fovea 7  
– All CAT anterior to amphidial fovea  
*D. eira* (INGLIS, 1968)
7. – Males with preanal Corn-set. Male and female with slender, conspicuously long and short SIAT, alternating  
*D. trispinosum* (ALLEN & NOFFSINGER, 1977)  
– Males without preanal Corn-set. SIAT not with alternating long and short tubes in male and female 8
8. – Several somatic setae in posterior body region with spiny cuticular insertion collar  
*D. spinosus* sp. n.  
– Somatic setae without spiny insertion collar 9
9. – Some somatic setae with pedicel setae, pedicels 1-8 µm 10  
– Somatic setae without pedicel setae 13
10. – Males with 5-9 SIAT. Females with 6-12 SIAT, all SIAT anterior to anus, 9-14 SvAT 11  
– Males with 12-14 SIAT. Females with 15 SIAT, with 1 SIAT posterior to anus, 16 SvAT  
*D. mawsoni* ALLEN & NOFFSINGER, 1977
11. – Males with 5-7 SIAT. Females with 9-13 SvAT 12  
– Males with 9 SIAT. Females with 14 SIAT  
*D. cobbi* ALLEN & NOFFSINGER, 1977
12. – Males and females with pedicel setae in ventrosublateral rows just anterior to SIAT. Spic = 45-53 µm. Females with 6-8 SIAT  
*D. demani* ALLEN & NOFFSINGER, 1977  
– No pedicel setae in ventrosublateral rows. Spic = 36 µm. Females with 12 SIAT  
*D. kreisi* ALLEN & NOFFSINGER, 1977
13. – Annulated body cuticle without ornamentation 14  
– Annulated body cuticle ornamented with spines, dots, vacuoles, granules 15
14. – Amphids long inverted U-shaped in male and female; male with 10 SIAT, 11 SvAT, spic = 29 µm; female with SIAT 11-13, SvAT 9-11  
*D. papuensis* sp. n.  
– Amphids with sexual dimorphism in shape : elongated unispiral in female, loop-shaped in male; male with 7 SIAT, 11 SvAT, spic = 46 µm; female with SIAT 8-11, SvAT 8-11  
*D. solidus* (GERLACH, 1952)
15. – Body cuticle with vacuolar and granular ornamentation  
*D. wieseri* ALLEN & NOFFSINGER, 1977  
– Ornamentation body cuticle spiny of dot-like 16
16. – Body annules ornamented 2 rows of dots 17  
– Spiny ornamentation of body cuticle 18
17. – Amphids long, oblique loop-shaped in female; female with slender tail, T/ABD = 5.6  
*D. chitwoodi* ALLEN & NOFFSINGER, 1977  
– Amphids inverted U-shaped in female, T/ABD = 3.9  
*D. timmi* ALLEN & NOFFSINGER, 1977
18. – Amphids long inverted U-shaped, about as long as rostrum 19

- Amphids short and wide inverted U-shaped  
*D. antillensis* DECRAEMER & GOURBAULT,  
1986
- 19. – Body small ( $L = 310 \mu\text{m}$ ); faint ornamenta-  
tion rostrum; annular ornamentation with  
minute spines; spic =  $26 \mu\text{m}$ ; male with 6  
SvAT *D. pusillus* sp. n.
- $L > 400 \mu\text{m}$ ; ornamentation rostrum and  
spiny ornamentation annules more conspi-  
cuous; spic longer; SvAT  $> 6$  in male
- 20. – Swollen pharyngeal region long and slender  
SER ( $L/W$ ) = 3.6 in male; sexual dimorphism  
in shape amphids; spic =  $39 \mu\text{m}$  tail shape  
similar in male and female  
*D. laingensis* sp. n.
- Swollen pharyngeal region shorter and wider

SER ( $L/W$ )  $< 3$ ; amphids inverted U-shaped  
in male and female; sexual dimorphism in  
tail shape; spic =  $68 \mu\text{m}$

*D. grootaerti* sp. n.

#### Acknowledgements

I am much indebted to Dr. P. GROOTAERT and Dr. J. VAN GOETHEM for putting samples from Laing Island and Duan-git Reef at my disposal. I thank Dr. E. GERAERT (RUG) for the loan of type material. I am also much obliged to M. W. VANMAELE for his technical help. The expeditions to Laing Island Biological Station are supported by the Belgian Fund for Joined Basic Research and by the Leopold III Foundation.

#### References

- ALLEN, M.W. & NOFFSINGER, E.M., 1978. A revision of the marine nematodes of the superfamily Draconematoidea FILIPJEV, 1918 (Nematoda : Draconematina). *University of California Publications in Zoology*, 109 : 1-133.
- DECRAEMER, W., 1982. Draconematidae and Epsilonematidae (Nematoda) from Laing Island, Papua New Guinea, with one new genus and three new species. *Bulletin van het Koninklijk Belgisch Instituut voor Natuurwetenschappen : Biologie*, 54 (1) : 1-19, 8 plts.
- DE GRISSE, A., 1965. Vergelijking van resultaten bekomen met de opspoelwattenfiltermethode (OWFM) en met de suikercentrifugedrijfmethode (SDM) voor de extractie van plantenparasitaire nematoden uit de bodem. *Mededelingen Rijksfakulteit Landbouw-wetenschappen, Gent*, 34 : 57-69.

INGLIS, W.G., 1968. Interstitial nematodes from St Vincent's Bay New Caledonia. *Expédition française sur les récifs coraliens de la Nouvelle Calédonie, Paris 1967*. Editions de la Fondation Singer-Polignac 2 : 29-74.

KREIS, H.A., 1938. Papers from Dr. Th. Mortensen's Pacific Expedition 1914-16, LXVIII. Neue Nematoden aus der Sudsee. *Viden-skabelige Meddelelser fra Dansk naturhistorisk Forening i Koben-havn*, 101 : 153-181.

W. DECRAEMER,  
Koninklijk Belgisch Instituut  
voor Natuurwetenschappen,  
Recent Invertebrate Section,  
Vautierstraat 29,  
B-1040 Brussels,  
Belgium.